MICROVITEC

SERVICE MANUAL

SERIES – 7 MK2
COLOUR DISPLAY MONITORS

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INTRODUCTION TO SERIES 7 MK2 COLOUR DISPLAY MONITORS

USING THIS MANUAL

This manual covers all the present Series 7 Mk 2 monitors, and is structured to give ease of access to information on any particular model.

An explanation of the structure and the way to find information is given below.

STRUCTURE OF MANUAL

Information is given in three main parts:

(1) General

The necessary safety standards and warnings; Specification Summaries, and a General Description of the operation of models in the series.

(2) PCBs and Interconnections

An information package on each printed circuit board used in the series. (This includes cicuit diagrams and descriptions, component layouts and lists, and test waveforms where appropriate). An Interconnections diagram for each model, external controls and pinout details.

(3) Access and setting up

Disassembly, reassembly and setting up after repair of major mechanical parts.

Descriptions are given of the basic models first, followed by information on additional features.

IDENTIFYING INFORMATION FOR PARTICULAR MODELS

The differences between models in the series are differences in construction; location and content of control panels; number of PCBs, and within PCBs, differences in circuits. In consequence, there are also differences in the interconnections.

Table 1 lists all the Series 7 Mk 2 models, and lists all the PCBs for each model. Each PCB is identified by its functional name, its circuit number and by its assembly number, which is also printed on a label on the PCB itself.

In Part 2 of this manual, one section is devoted to each type of PCB, according to its functional name. Within that section, information is given on each version of that PCB, in turn. The separate versions are identified by their Assembly numbers.

Table 1 also lists the Interconnection Diagram and Cabinet Style for each model. Interconnection diagrams are identified by circuit number both in the table and in the Interconnections section in Part 2. Cabinet styles are identified both in the table and in Part 3 (Access and Setting Up) by their series letter (E series, F series and so on).

Table 2 lists all the Series 7 Mk 2 models and, for each model, lists all its main features.

Information on these features is outlined in the following paragraphs. A more detailed description is given in the General Description at the end of Part 1 and, where appropriate, in the PCB sections of Part 2.

Table 3 lists the model variants and gives the significance of each model number.

Thus, both details and general information on any particular model may be found by reference to the tables in this section.

NEW MODELS

As models are added to the series, information will be added to the manual in the form of appendices to the appropriate sections, including this one.

GENERAL DESCRIPTION

FEATURES OF SERIES 7

The Series 7 Monitor is a high definition, high resolution colour monitor with special features that make it suitable for use with a computerised system

Some features are common to all models in the series, and others are additional on particular models.

BASIC MODEL AND VARIANTS

The basic model has the following principal features.

AUTOSCAN. This enables the monitor to accept and display inputs over a wide range of line and frame rates.

TTL/ANALOGUE INPUTS. By manual selection, either TTL or Analogue video inputs can be accepted for display. TTL may be in either 4 bit or 6 bit code.

SYNC. A variety of sync input formats is accepted.

A number of variants of this basic model are produced, allowing a choice of screen size, mains input voltage and so on. The model numbers for these variants define, in coded form, the characteristics of the model variant. These are detailed in Table 3.

MODELS WITH ADDITIONAL FEATURES

Series 7 Monitors includes a second class of models.

These have all the features of the basic model, and in addition have one or more of the following features.

PAL/NTSC. By manual selection, one or other of these formats may be accepted, decoded and displayed whenever it is presented. Fast switching circuits (at pixel speed) enable it to be displayed at the same time as a separate analogue input.

TOUCHSCREEN. The Touchtech Touchscreen provides for a finger-pointing method of interfacing with the host computer whenever the viewer is invited to choose a particular part of the screen to touch.

PS2. As an alternative to a digital video output in TTL format, some computer systems are able to provide an analogue video output compatible with the PS2 (Personal System 2). Series 7 Monitors fitted with the PS2 feature can receive and display PS2 format video as an alternative to TTL. This is in addition to the existing choice between analogue and TTL inputs.

DIFFERENTIAL INPUT. This facility is provided, mainly on Dealing Room models, to avoid problems of interference pick-up (eg earth loops). It is not a true differential input system in that the screened cables are earthed at the generator end, but the input amplifiers in the monitors receive the signal differentially.

3 BIT TTL INPUT. This facility enables the monitor to accept a three bit TTL input and to convert it to a six bit format for decoding and display.

MANUAL DEGAUSS. In addition to the automatic degaussing at Power On, a pushbutton provides the facility for degausssing at any time.

BLOCK DIAGRAMS DESCRIPTION

BASIC MODEL

This section provides an overview of the Basic Models in the form of block diagrams which show the principal functions of, and signal routing within the PCBs. A Signal Selection Diagram shows how switching is controlled to select analogue or TTL video, the associated sync pulses and preset picture controls. The accompanying text outlines the process. The diagrams given are:

Interface PCB: Video and Sync Routeing

Interface PCB: Picture Size and Position Controls

Deflection PCB:

Basic Model: Signal Selection

More detailed information is provided in the separate sections for the PCBs.

ADDITIONAL FEATURES

Where appropriate, block diagrams and accompanying text are included in the separate sections on the additional features.

MECHANICAL DESCRIPTION

Separate cabinet styles and construction methods are used for the different sizes of monitors. The styles are referred to as E Series, N Series and so on. Details are given under Access, in Part 3.

In each style, circuits are on PCBs which are mounted behind, below and on either side of the CRT. Where access to the PCBs is limited, the PCBs may be tilted to a service position for improved access.

All connections to and from any PCB are via connectors which may be unplugged. Connections between PCBs and to external connectors and controls are via cable harnesses.

PCBs are mounted on stand-off posts and fixed with screws or plastic retaining clips. They are variously fixed to the cabinet base, an internal metal chassis and the CRT base.

All preset controls that may require adjustment after repair or replacement of parts are directly accessible with the monitor fully assembled except for its cover.

SIGNAL SELECTION: TTL/ANALOGUE: BASIC MODEL

TTL INPUT

TTL input may be 4 bit (offering 16 colour/intensity combinations), or 6 bit (offering 64 colour/intensity combinations). Conventionally, 4 bit TTL carries negative going vertical sync, and 6 bit TTL carries positive going vertical sync. With the 4BIT/6BIT/AUTO switch set to AUTO, TTL sync is fed to a sync polarity detector (4/6 bit detector) which switches the TTL Decoder to 4 bit or 6 bit working, according to the polarity of the sync input. The 4 BIT and 6 BIT positions of the switch allow for manual selection of 4 or 6 bit decoding. Decoding produces a pseudo-analogue output of R, G, B, from the TTL input.

The 4 bit/ 6 bit selection signal from the detector is also used to select between two dedicated sets of preset controls for width, height, horizontal and vertical shift.

With the choice between the two types of TTL input thus made, the TTL input is available as an alternative to the analogue input.

ANALOGUE INPUT

Analogue input is in the form of separate RGB signals, and may have a separate line for sync, or sync may be on the green signal line. Detection and selection of analogue sync is not carried out unless analogue input is selected.

TTL/ANALOGUE SWITCH

This switch puts out TTL Enable or Analogue Enable signals according to its setting. The signals are used to select between TTL and analogue RGB, TTL and analogue sync, and TTL and analogue presets for width, height, horizontal and vertical shift.

Selected R,G,B signals go via a user-operated gain control to the tube base, for display.

Selection is made between the separate-line analogue sync and TTL sync. Horizontal and vertical sync detectors separate these signals and pass them through to the Drive/Deflection PCB.

If analogue sync is selected, and horizontal sync is not detected, a switch changes over to the analogue green line as the alternative source of sync.

If analogue sync is selected, and vertical sync is not detected, a switch changes over to drive vertical sync from the horizontal sync processor in the Drive/Deflection PCB.

Thus, whichever form of analogue sync is supplied, and whichever format is adopted for TTL, the selection of either TTL or analogue is fed forward for display.

PAL/NTSC FEATURE (TABLE 2)

The composite video signal provided in either PAL or NTSC format requires decoding. Decode facilities are provided for both and one is selected by the setting of the PAL/NTSC switch.

Analogue input is accepted in the range of 15kHz to 36kHz line rate. Filters detect input line rates as being above or below 16kHz. With a line rate below 16kHz, the incoming signal is assumed to be PAL (15.625kHz) or NTSC (15.570), and the signal is switched to the PAL or NTSC decode circuits, as selected. For a line rate above 16kHz, the signal is assumed to be analogue, and the auto-scan circuits find and lock onto the incoming line and frame rates. Whichever format the incoming signal has, it is produced as analogue RGB, with the appropriate sync.

Fast switching between the decoded composite video signals and signal from the TTL or analogue input, enables both to be displayed at the same time.

Monitors with the PAL/NTSC feature do not have the facility to accept sync from an analogue sync-on-green input.

PS2/DIFFERENTIAL INPUT FEATURES (TABLE 2)

This is really three separate features, all incorporated together in one model.

1. The facility is provided for a PS2 format analogue input to be received instead of the digital TTL input. Switching circuits enable the selected signal to be processed.

2. Switching circuits enable a 3 bit TTL input to be received and converted to a 6 bit TTL code, and thereafter to be processed as a 6 bit input.

3. To minimise the effects of common-mode pick-up on long cables supplying several monitors, the red, green and blue analogue inputs are fed as signals isolated from the monitor earth. Differential input amplifiers are provided to receive these signals, and HF peaking is also provided. Loop- through connectors enable inputs to be connected in cascade, and a switch enables the last monitor to provide cable terminations.

TOUCHSCREEN FEATURE

Infra red beams across the front of the display, and their associated sensors, enable the location of a finger pointed at the screen to be sensed and transmitted back to a controlling computer. In this way, an additional interaction between user and computer is possible.

Touchscreen can be operated in a number of modes.

APPENDIX A

ADDITIONS TO SERIES 7 MK2

Issue: Date:

This appendix provides data on late additions to the Series 7 MK 2 range of colour monitors. The data is in the form of supplements to Tables 1, 2, and 3 in the foregoing text, together with any explanatory notes thought necessary.

TABLE 1

MODEL	12L72DNR1	12L72DRR1	12L71DNR1	12L71DNS3	704	604	705
PCBs, MODULES							
INTERCONNECTIONS	- GO1906	- GO1906	- GO1906	- GO1906*	- GO1716	- GO1716	- GO1366
DRIVE/DEFLECTION	AO3638 GO1452	AO3638 GO1452	AO4012 GO1452	AO4195 GO1558	AO3979 GO1580	AO3979 GO1580	AO3181 GO1284
PANORAMIC SYNC	AO3638 GO1452	AO3638 GO1452	AO4012 GO1452	AO4195 GO1558	AO3979 GO1580	AO3979 GO1580	AO3181 GO1284
TUBE BASE	AO3638 GO1452	AO3638 GO1452	AO4012 GO1452	AO4195 GO1558	AO3979 GO1580	AO3979 GO1580	AO3181 GO1284
SWITCHED MODE POWER SUPPLY	AO3638 AO3857 GO1471	AO3638 AO3857 GO1471	AO4012 AO4071 GO1471	AO4195 AO4194 GO1559	AO3979 AO3762 GO1152	AO3979 AO3762 GO1152	AO3181 AO3734 GO1286
INTERFACE	AO3858 GO1456	AO3858 GO1456	AO3858 GO1456	AO4098 GO1557	AO3225 GO1581	AO3225 GO1581	AO3510 GO1285
FRONT CONTROLS	AO3355 GO1160	AO4051 GO1160	AO3355 GO1160	AO3355 GO1160	- GO1716	- GO1716	- GO1366
REAR CONTROLS	- -	AO2976 GO	- -	- -	AO3230 GO1586	AO3230 GO1586	AO3030 GO

TABLE 1 (continued)

ADDITIONAL FEATURES

	12L72DNR1	12L72DRR1	12L71DNR1	12L71DNS3	704	604	705
PS2/DIFF. INPUT	AO3859 GO1331	AO3859 GO1331	AO3859 GO1331	AO4101 GO1566	- -	- -	- -
DECODER	- -	- -	- -	- -	AO3978 GO1498	AO3978 GO1498	- -
TOUCHSCREEN	- -	- -	- -	- -	AO4114 -	- -	AO2459 -
DC-DC CONVERTER	- -	- -	- -	- -	- -	- -	AO3177 GO1287
CABINET STYLE	N Series	R Series	N Series	N Series	F Series	F Series	F Series

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TABLE 1

BASIC MODEL	All 14 inch Models	20H718ES2	20H728ES2	20L718ES2	20L728ES2
PCBs, MODULES					
INTERCONNECTIONS	- GO1177	- GO1907	- GO1907	- GO1907	- GO1907
DRIVE/DEFLECTION	AO4233 GO1150	AO4206 GO1150	AO4206 GO1150	AO4206 GO1150	AO4206 GO1150
PANORAMIC SYNC	AO4233 GO1150	AO4206 GO1150	AO4206 GO1150	AO4206 GO1150	AO4206 GO1150
TUBE BASE	AO4233 GO1150	AO4206 GO1150	AO4206 GO1150	AO4206 GO1150	AO4206 GO1150
SWITCHED MODE POWER SUPPLY	AO4233 AO4240 GO1152	AO4206 AO4231 GO1152	AO4206 AO4576 GO1152	AO4206 AO4231 GO1152	AO4206 AO4576 GO1152
INTERFACE	AO3510 GO1151	AO4537 GO1151	AO4537 GO1151	AO4537 GO1151	AO4537 GO1151
FRONT CONTROLS		AO2749 GO1165	AO2749 GO1165	AO2749 GO1165	AO2749 GO1165
REAR CONTROLS	AO3030				
BNC LOOP THROUGH		AO4540 GO1800	AO4540 GO1800	AO4540 GO1800	AO4540 GO1800

TABLE 2

Model (Note 1)	TTL/Analogue Input. Autoscan	PAL/NTSC Input	PS2(Note 2) Differential Input	Touchscreen
20H718ES2				
20L718ES2				
20H728ES2				
20L728ES2				
14H727TS2E*	Y	-	-	-
14H717TS2U*	Y	-	-	-
12L72DNR1	Y	-	Y	-
12L71DNR1	Y	-	Y	-
12L72DRR1	Y	-	Y	-
12L71DNS1	Y	-	Y	-
604	Y	Y	-	Note 3
704	Y	Y	-	Y
705	Y	-	-	Y

Key : Y = Feature Present

\- = Feature Absent

NOTES

1 Model numbers define variants. See Table 3.

2 The IBM PS2 Computer requires an input to define the type of monitor to which it is connected.

To provide this input for the Series 7 MK 2 Monitor, connect pin 10 (0V) to pin 11 on the 15 pin D type connector at the computer end of the connecting cable.

3 Touchscreen can be added to bring this model to 704 standard.

* Suffix E or U deleted from later models.

SERIES 7 MK2 : EXTERNAL PINOUTS

GENERAL

Series 7 Mk 2 Monitors are equipped with facilities for both Analogue and TTL input. A Source Select switch on the monitor selects the input source.

Pinout details for the connectors are provided below.

TTL SELECT SWITCH (BASIC MODELS)

A 3 position slide switch is set to match the TTL input in its 4 BIT and 6 BIT positions. In the AUTO 4/6 BIT position, 4 bit or 6 bit input is selected automatically.

The polarity of the vertical sync determines the operating mode as follows:-

4 bit TTL: positive going vertical pulse.



6 bit TTL: negative going vertical pulse.

TTL INPUT (BASIC MODELS)

Video input information is at TTL levels with 4 bit or 6 bit format.

TTL CONNECTOR (9 WAY D TYPE)

Pin	Signal (4 bit)	Signal (6bit)
1	Ground	Ground
2	-	Red (LSB)
3	Red (MSB)	Red (MSB)
4	Green (MSB)	Green (MSB)
5	Blue (MSB)	Blue (MSB)
6	Intensity	Green (LSB)
7	-	Blue (LSB)
8	Horizontal or Composite sync	Horizontal or Composite sync
9	Vertical sync	Vertical sync

NOTE

Pinout details are shown viewed from the mating side of the fixed socket and rear (solder side) of the connector plug.

The input configurations used are determined by the setting of the TTL select switch.

SERIES 7 MK2 : EXTERNAL PINOUTS

ANALOGUE INPUT (BASIC MODELS)

Analogue Video is in the form of three signals, R (Red), G (Green), B (Blue).

These signals have a nominal value of 0.7V Peak-to-Peak amplitude, and with a maximum rating of 1.4V amplitude.

The format of signals to the analogue inputs may be any of the following. Selection of the configuration and processing of the input signals is performed automatically by the monitor.

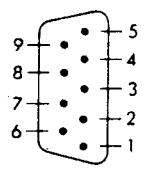
Analogue RGB with mixed sync of either polarity

Analogue RGB with separate sync of either polarity

NOTE

Analogue inputs without mixed sync or horizontal sync pulses will automatically default to sync on green.

ANALOGUE CONNECTOR (9 WAY D TYPE)



Pin	Signal
1	Red
2	Green
3	Blue
4	Sync (Horizontal or Composite)
5*	Mode (PGA)/Vertical sync
6	Red ground
7	Green ground
8	Blue ground
9	Sync ground

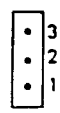
NOTES

1. Pinout details are shown viewed from the mating side of the fixed socket and rear (solder side) of the Connector Plug.

2. The mode available on Pin 5* is determined by the position of the Link Connector on PL518. This is a 3 pin (2 position) connector on the Interface PCB.

Link Connector details are as follows:

PL518



PGA Mode: Pins 1 & 2 linked on PL518

Vertical Sync: Pins 2 & 3 linked on PL518

SERIES 7 MK2 : EXTERNAL PINOUTS

VIDEO SOURCE SELECT SWITCH (BASIC MODELS)

A Video Source Select switch is normally provided on Series 7 Mk2 Monitors.

The Switch must be set to the video input source required prior to operation.

On 14 inch CRT models the Video Source Select switch is a 2 position slide switch marked ANALOGUE and TTL.

This switch is normally located at the rear of the monitor.

On 20 inch CRT models the Video Source Select switch is a 4 position rotary switch mounted on the front control area of the monitor.

This switch is normally marked - AUX 1, AUX 2, ANALOG, TTL.

On specially customised models only, switch positions AUX 1 and AUX 2 provide for specially configured programme sources/inputs, and/or modules.

PS2/TTL SWITCH (ADDITIONAL FEATURE)

This configures the input circuits to accept either TTL or PS2 input, according to its setting.

TTL INPUT: PS2 INPUT (ADDITIONAL FEATURE)

Video input information is at TTL levels with 3 bit, 4 bit or 6 bit format. With PS2 selected, an analogue input replaces the TTL input. See Table 2 in the Introduction section for model numbers.

TTL/PS2 INPUT CONNECTOR (9 WAY D TYPE)

Pin	Signal 3 bit	Signal 4bit	Signal 6 bit	Signal PS2
1	Ground	Ground	Ground	Red
2	-	-	Low Int Red	Green
3	Red	Red	Red	Blue
4	Green	Green	Green	Horiz Sync
5	Blue	Blue	Blue	Vert Sync
6	-	Intensity	Low Int Green	Red Ground
7	-	-	Low Int Blue	Green Ground
8	Horz Sync	Horz Sync	Horz Sync	Blue Ground
9	Vert Sync	Vert Sync	Vert Sync	Sync Ground

NOTE

1. The IBM PS2 computer requires an input to define the type of monitor to which it is connected.

To provide this input, connect pin 10 (0V) to pin 11 on the 15 pin D Type connector at the computer end of the connecting cable.

2. Pinout details are shown viewed from the mating side of the fixed socket and rear (solder side) of the connector plug.

3. The input configurations used are determined by the setting of the TTL select switch.

ANALOGUE INPUT: PAL/NTSC (ADDITONAL FEATURE)

Analogue Video is in the form of three signals, R(Red), G (Green), B (Blue). These signals have a nominal value of 0.7V Peak to Peak amplitude and a maximum rating of 1.4V amplitude.

The analogue inputs may be any of the following. Selection of the configuration and processing of the signals is automatic within the monitor, except that the choice between NTSC and PAL is by manual switching.

(a) ALL MODELS

(1) Analogue RGB with mixed sync of either polarity

(2) Analogue RGB with separate line end field sync of either polarity.

(b) MODELS WITHOUT PAL/NTSC FEATURE

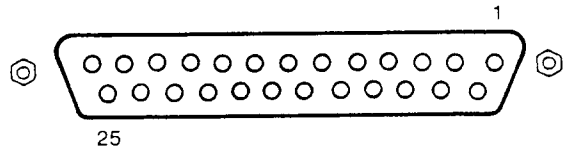
(3) Analogue RGB with Sync on Green

(c) MODELS WITH PAL/NTSC FEATURE

(3) Composite video with sync

Analogue inputs are made via a 25 pin D type connector on all models with the PAL/NTSC feature. See Table 2 in the Introduction section for model numbers.

ANALOGUE CONNECTOR (25 WAY D TYPE)



Pin	Signal
1	-
2	-
3	Blue Ground
4	Blue
5	Green Ground
6	Green
7	Red Ground
8	Red
9	Composite Video/Sync Ground
10	-
11	Screen Ground
12	-
13	-
14	Audio Input, Right
15	Audio Ground
16	Audio Input, Left
17	-
18	Vertical Sync
19	Sync Ground
20	Horz Composite Sync
21	Fast Blanking
22	Fast Blanking Ground
23	Composite Video/Sync
24	-
25	-

ANALOGUE PS2 DIFFERENTIAL INPUT

Differential inputs are made via BNC connectors. For the models on which these are used, see Table 2 in the Introduction section.

HI Z/75R SWITCH

Inputs may be looped through to further monitors, or terminated by setting the HI Z/75R switch to 75R.

MODELS 604, 704

TTL CONNECTOR (9 WAY D TYPE)

This accepts 4 bit or 6 bit TTL, according to the setting of the 6BIT/4BIT/AUTO slide switch.

Pin	4 Bit Signal	6 Bit Signal
1	Ground	Ground
2	-	Low Intensity Red
3	Red	Red
4	Green	Green
5	Blue	Blue
6	Intensity	Low Intensity Green
7	-	Low Intensity Blue
8	Horiz Sync	Horiz/Comp Sync
9	Vert Sync	Vert Sync

NOTE

In TTL Mode, stereo audio inputs are from two (L & R) phono jacks.

ANALOGUE CONNECTOR (25 WAY D TYPE).

Pin	Signal	Pin	Signal
1	-	13	-
2	-	14	Audio (R Channel)
3	Blue Ground	15	Audio Screen (R & L Channels)
4	Blue	16	Audio (L Channel)
5	Green Ground	17	-
6	Green	18	Vert Sync
7	Red Ground	19	Ground (Vert, & Horiz/ Comp Sync)
8	Red	20	Horiz/Comp Sync
9	Comp Video/Sync Ground	21	Fast Blanking
		22	Ground (Fast Blanking)
10	-	23	Comp/Video Sync
11	Screen Ground	24	-
12	-	25	-

NOTE

In Analogue Mode, stereo audio inputs are from the Analogue Connector.

TOUCHSCREEN SERIAL COMMUNICATIONS CONNECTOR (9 WAY D TYPE).

Pin	Signal
1	-
2	Receive Data
3	Transmit Data
4	-
5	Signal Ground
6	-
7	Request to Send
8	Clear to Send
9	-

NOTE
This connector is fitted on Model 604, to enable the Touchscreen facility to be added.

MODEL 705

TTL CONNECTOR (9 WAY D TYPE)

This accepts 4 bit or 6 bit TTL, according to the setting of the 6BIT/4BIT/AUTO slide switch.

Pin	4 Bit Signal	6 Bit Signal
1	Ground	Ground
2	-	Low Intensity Red
3	Red	Red
4	Green	Green
5	Blue	Blue
6	Intensity	Low Intensity Green
7	-	Low Intensity Blue
8	Horiz Sync	Horiz/Comp Sync
9	Vert Sync	Vert Sync

NOTE

In TTL Mode, stereo audio inputs are from two (L & R) phono jacks.

ANALOGUE CONNECTOR (9 WAY D TYPE)

Pin	Signal
1	Red
2	Green
3	Blue
4	Horiz Sync/ Comp Sync
5	Vert Sync/ PGA Mode
6	Red Ground
7	Green Ground
8	Blue Ground
9	Sync Ground

NOTE
Depending on source, pin 5 may be configured for Vertical Sync or for IBM, EGA, PGA, etc modes.

MODELS : ALL 12 inch models.

TTL CONNECTOR (9 WAY D TYPE)

This accepts 3 bit, 4 bit or 6 bit TTL input, according to the setting of the 3 BIT, 4 BIT, 6 BIT, AUTO 4/6 BIT slide switch, or PS2 analogue input if this is present. The configuration of the connector changes, as follows:

Pin	3 Bit Signal	4 Bit Signal	6 Bit Signal	PS2 Signal
1	Ground	Ground	Ground	Red
2	-	-	Low Int Red	Green
3	Red	Red	Red	Blue
4	Green	Green	Green	Horiz Sync
5	Blue	Blue	Blue	Vert Sync
6	-	Intensity	Low Int Green	Red Ground
7	-	-	Low Int Blue	Green Ground
8	Horz Sync	Horz Sync	Horz Sync	Blue Ground
9	Vert Sync	Vert Sync	Vert Sync	Sync Ground

SERIES 7 MK2: SERVICE ACCESS

IMPORTANT NOTES

Refer to the notes in the Safety Standards Section contained in this Manual, before carrying out any of the following operations. The safety guidelines given in these notes apply to the repair, service, and/or replacement of parts or components, and if attempting adjustments to the monitor in any way.

WARNING

Ensure the monitor is disconnected from the mains electrical supply BEFORE effecting any of the operations detailed.

DANGER!

The picture tube stays charged to the full EHT voltage of 25kV.

Discharge the tube BEFORE attempting to remove the EHT cap (Poppy) connector. (See Safety Standards Section).

Observe the warning to delay handling the chassis for 30-60 seconds after switch-off.

GENERAL MECHANICAL DETAIL

Details on how to gain access for service on the various models in the current range of Series 7 Monitors is provided with the illustrations and notes following.

CABINET STYLES/TUBE SIZES

Cabinet styles used for Series 7 Mk2 Monitors are:

E Series:	20 inch tube
F Series:	15 inch FST tube with Touchscreen attachment facility option
N Series:	12 inch tube
R Series:	12 inch tube (special)
T Series:	14 inch tube

For any other styles, see Appendix A to this Section.

E SERIES CABINET (20 INCH MODELS)

The E Series cabinet assembly is an all metal construction, except for a plastic injection moulded Front Fascia.

A general view of the cabinet and mechanical chassis construction is shown in Figure E1, E Series Cabinet: Exploded View.

CABINET BACK REMOVAL

1. Remove the mains supply lead from the power point. Unplug all connecting leads from the monitor.

2. See Fig E2, E Series: Fixing Screw Locations

Remove:
- 4 x Fixing Screws and Washers (A)
- 2 x Fixing Screws and Washers (B)
- 1 x Fixing Screw and Washer (C)

3. See Fig E3, E Series: Cabinet Locating Brackets.

Disengage cover from the locating brackets shown on the underside of the Cabinet Shell then withdraw Cabinet Back towards the rear to provide access.

NOTE

When re-fitting the Cabinet Back, ensure the back is correctly located in the locating brackets, BEFORE replacing and tightening the Cabinet Back fixing screws.

MAIN CHASSIS/CABINET ASSEMBLY

To detach the main Metal Chassis Assembly

1. Discharge the tube. See SAFETY STANDARDS section.

2. Unplug interconnections as necessary.

3. Detach Tube Base PCB Assembly from CRT Tube Base.

4. Disconnect EHT Connector from Picture Tube.

5. Place monitor face downwards on suitable padded blocks.

6. Detach four Fixing Nuts and four Washers from the cabinet/chassis fixing studs, (shown in Figure E4, E Series: Main Chassis/Cabinet Assembly).

7. Hinge the chassis, pivoting it towards the bottom rear of the cabinet, to disengage the tongue and slot locations shown in Figure E5, E Series: Chassis Removal.

8. The Metal Chassis may now be withdrawn from the Cabinet Front and chassis securing studs.

SERIES 7 MK2: SERVICE ACCESS

Key	Description
1	Cabinet Front
2	Cabinet Shell
3	Chassis Front
4	Chassis Rear
5	Cabinet Back

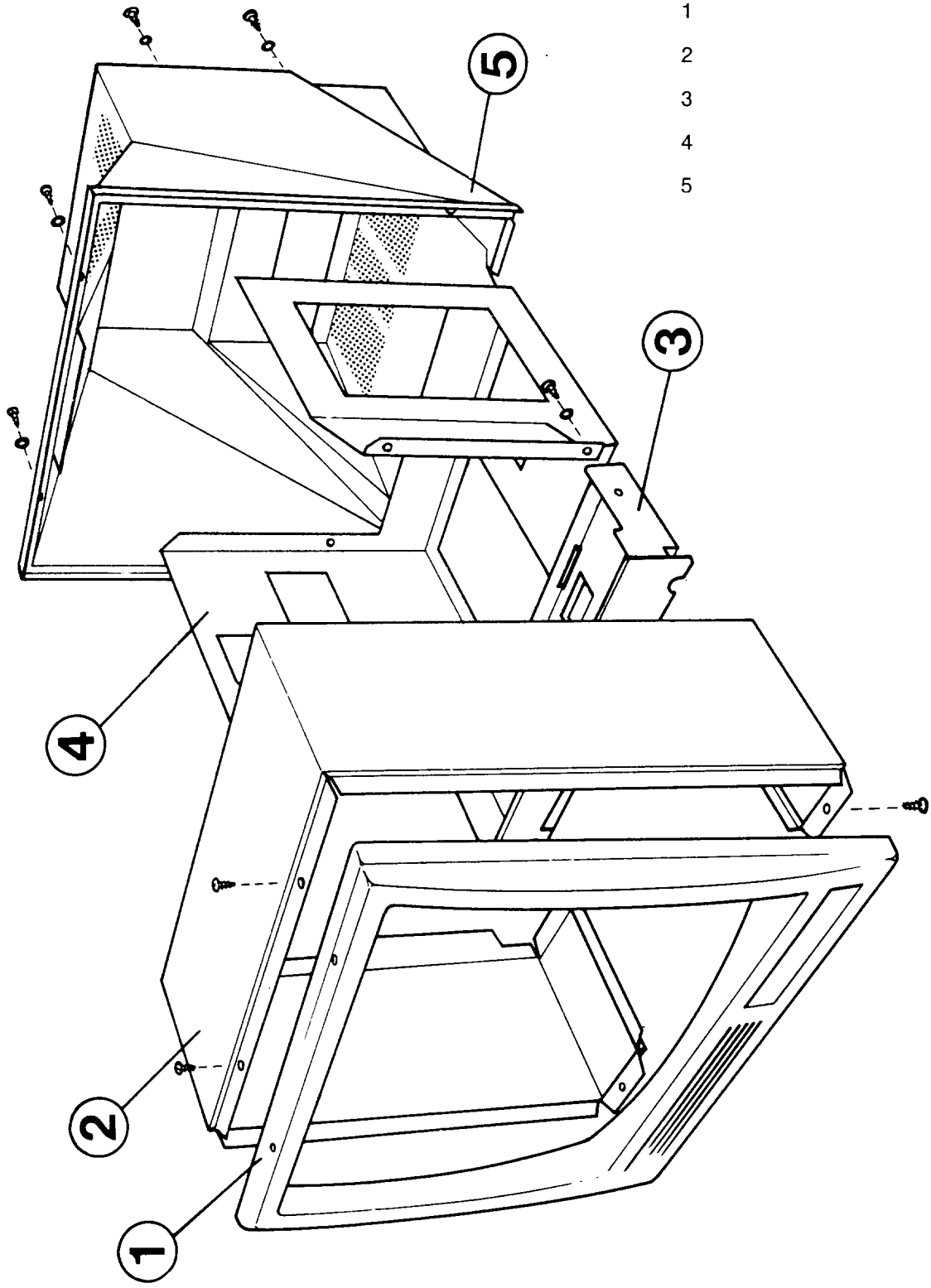


Fig E1 E SERIES EXPLODED VIEW

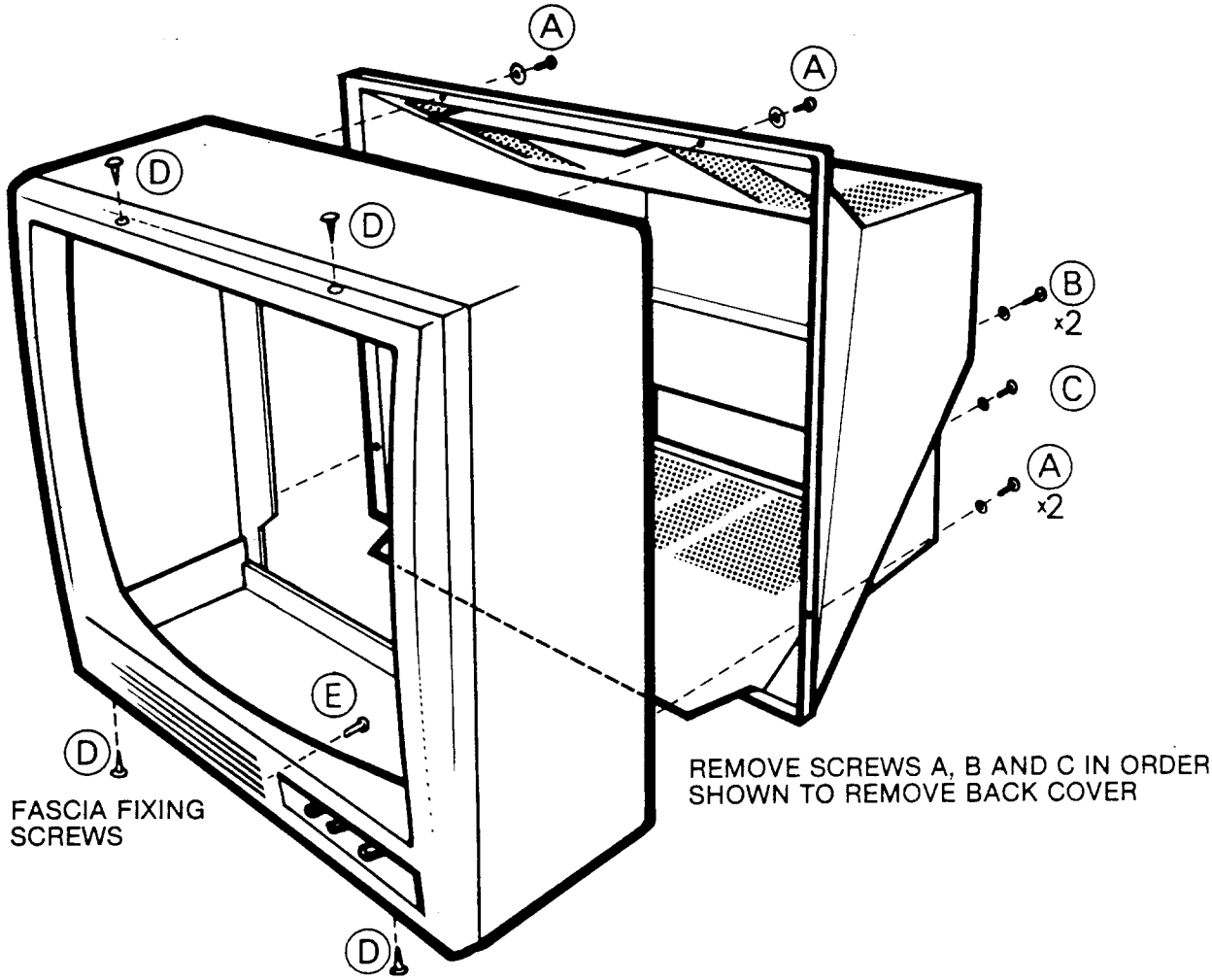


Fig E2 E SERIES FIXING SCREW LOCATIONS

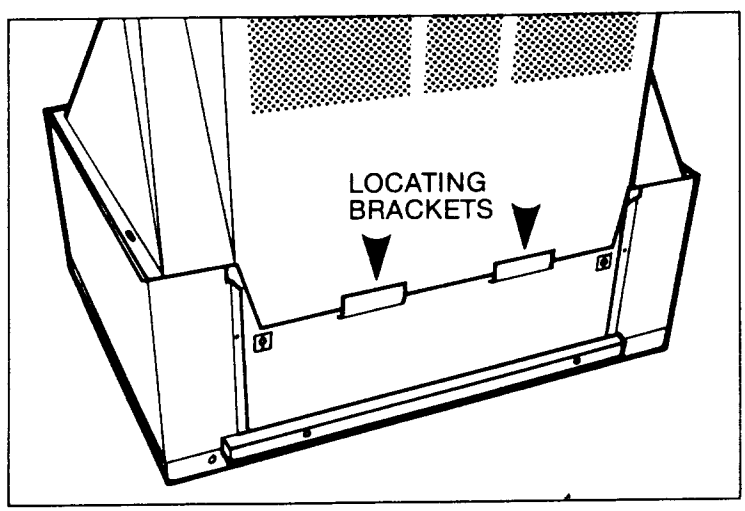


FIG E3 E SERIES CABINET BACK LOCATING BRACKETS

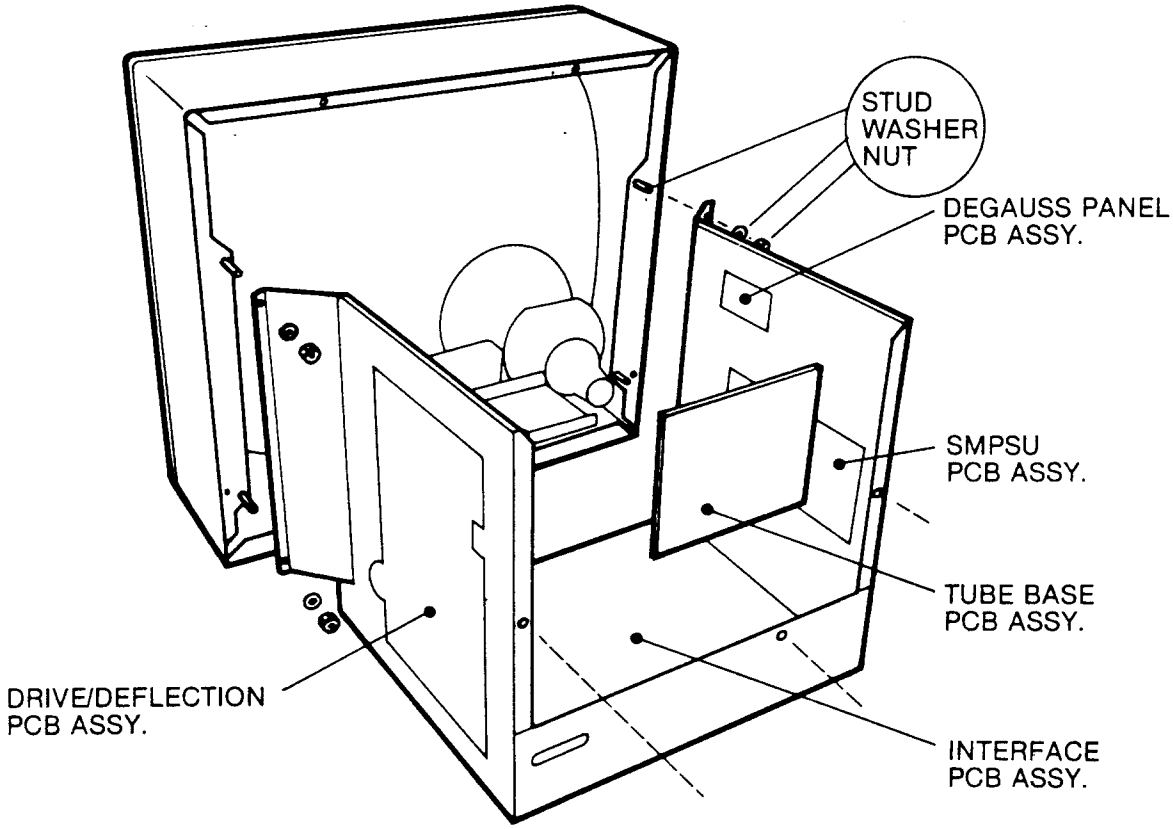


FIG E4 E SERIES PCB LOCATIONS

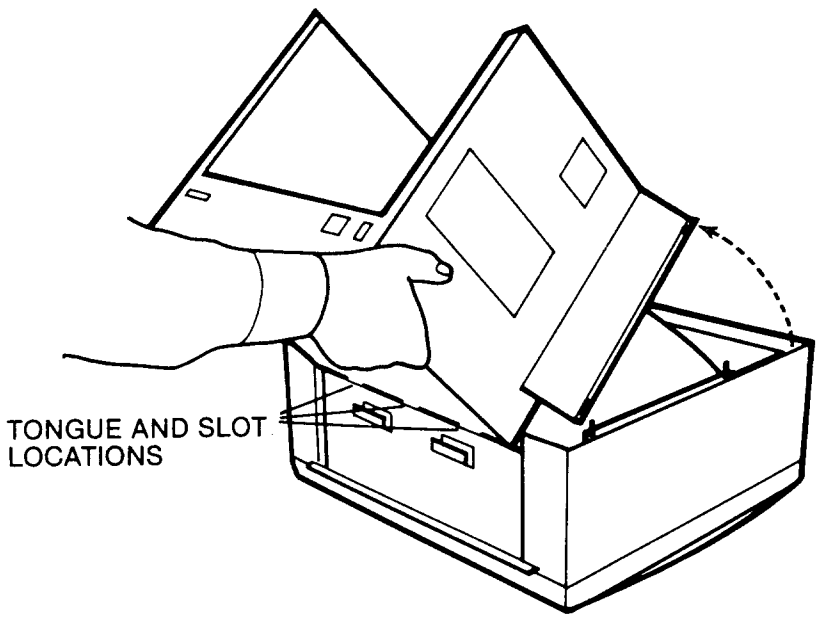


FIG E5 E SERIES CHASSIS REMOVAL

CABINET FRONT/CABINET SHELL ASSEMBLY

To detach the Cabinet Front Moulded Fascia, item (1) from the Cabinet Shell, item (2) shown in Fig E1, E Series Cabinet: Exploded View.

1. Detach the main metal chassis as in 1 to 6, above.

2. Refer to Fig E2, E Series: Fixing Screw Locations.

a) Detach: 4 x countersunk fixing screws (D) from the Cabinet Front moulded fascia.

b) Detach: 1 x fixing screw (E), located through the Chassis Front into the inside face of the Cabinet Front moulded fascia.

3. Withdraw, upwards, the combined Cabinet Shell and Chassis Front.

4. Reassemble in reverse order.

F SERIES CABINET (15 INCH FST MODELS)

The F Series cabinet assembly is a composite metal and injection-moulded parts construction.

A general view of the cabinet assembly and exploded view of the chassis construction is shown in Figure F1, F Series Cabinet: Exploded View. The location of PCBs is also shown.

CABINET COVER REMOVAL

1. To remove the Cabinet Cover - first unplug all connecting leads and remove the mains supply lead from the power point.

2. Refer to illustration F2.

a) Detach: 2 x Fixing Screws (A) from Cabinet Base moulding

2 x Fixing Screws (B) from Cabinet Cover sides

2 x Fixing Screws (C) from Cabinet Cover back

b) Withdraw cabinet cover moulding backwards - to clear assembly and to provide service access.

MAIN CHASSIS/CABINET ASSEMBLY

Refer to Figure 1, F Series: Exploded View for general construction and assembly details, and in relation to the notes following:

MAIN CHASSIS ACCESS

1. To provide service access to the Main Chassis and Drive/Deflection PCB Assembly - refer to Figure F2, F Series: Input Bracket.

a) Unscrew one turn only - 2 x Fixing Screws (A) located on the bottom inside flange of the Input Bracket.

b) Detach: 2 x Fixing Screws (B) from top ends of Input Bracket securing bracket to chassis.

c) Release Input Bracket by drawing rearwards to clear chassis assembly and provide access.

Key	Description
1	Front
2	Top Cover
3	Base
4	Chassis Main Frame
5	Cross Brace Plate
6	Bracket
7	Bracket
8	Touchscreen Housing
9	Loudspeaker Bracket

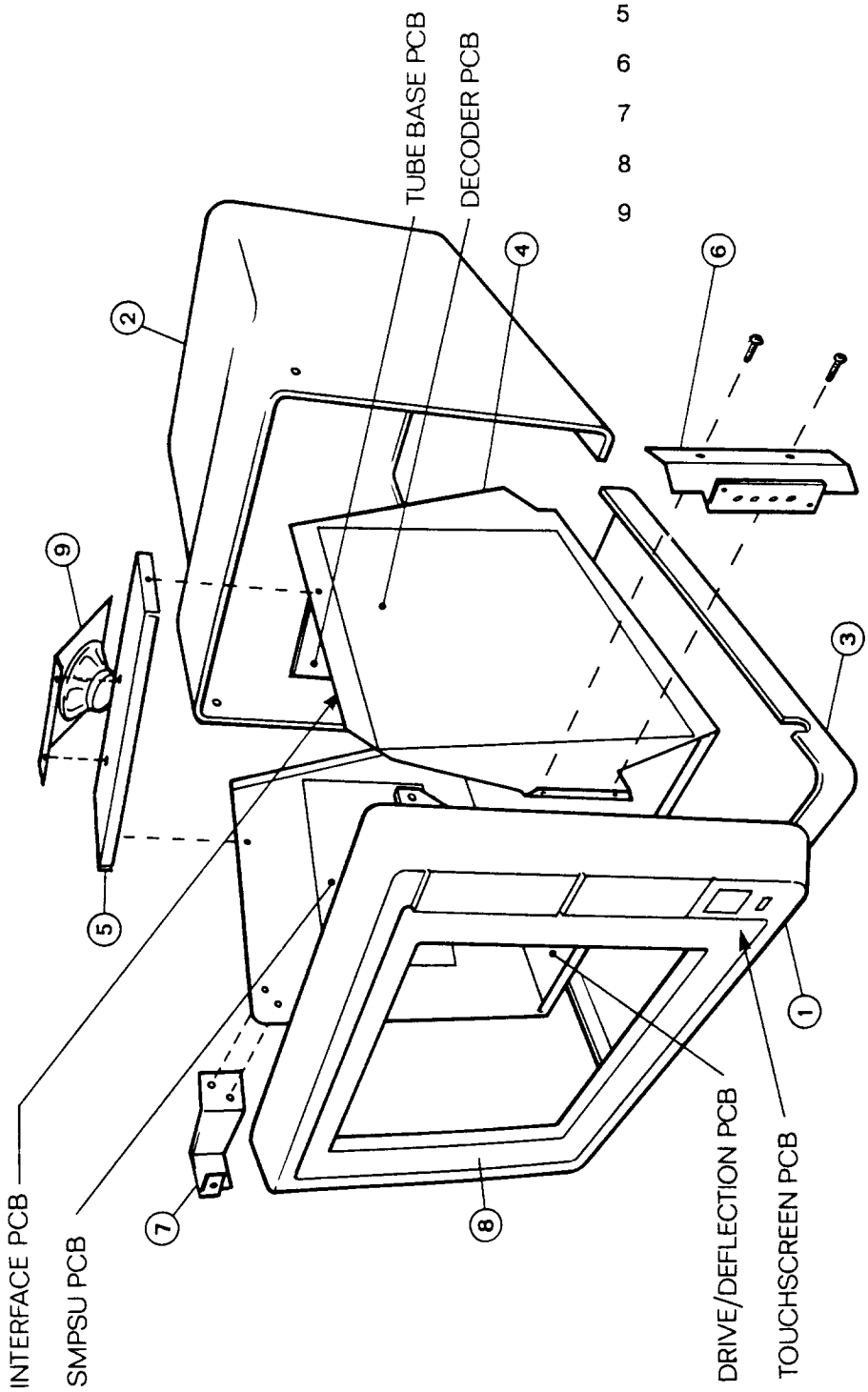


FIG F1 F SERIES EXPLODED VIEW

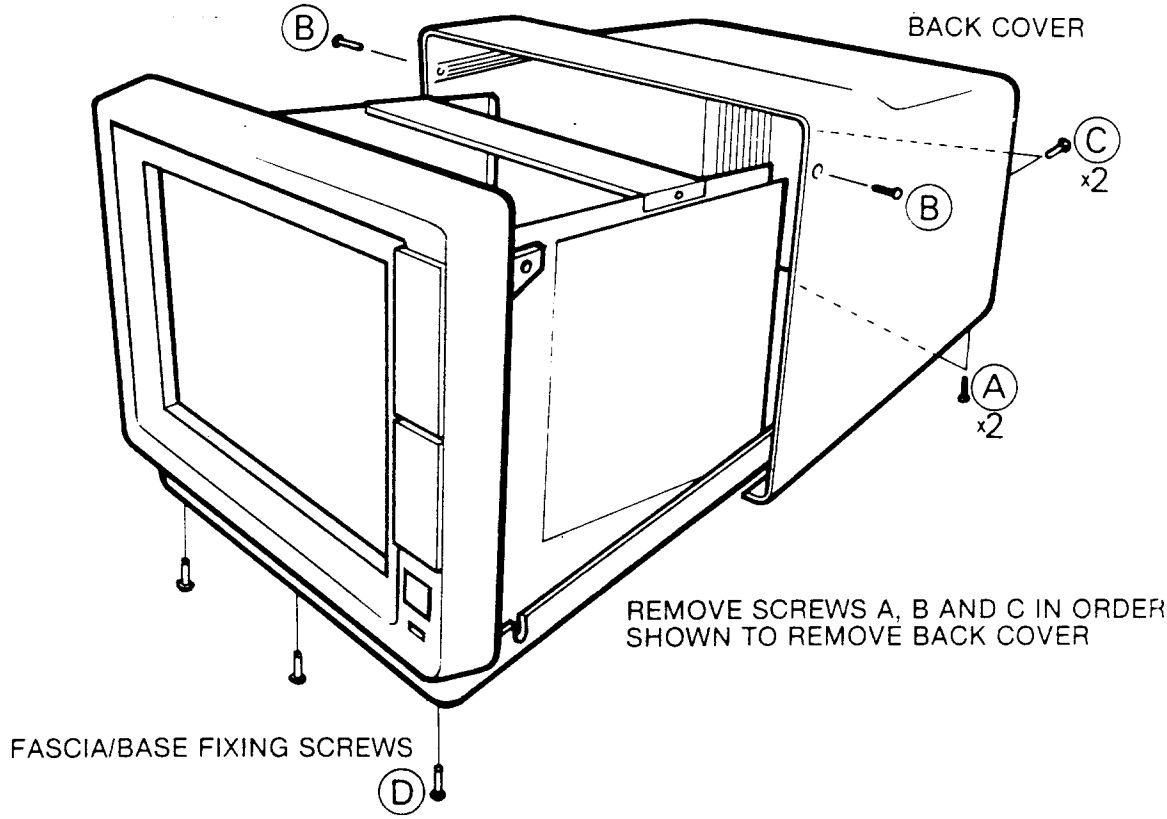


FIG F2 F SERIES FIXING SCREW LOCATIONS

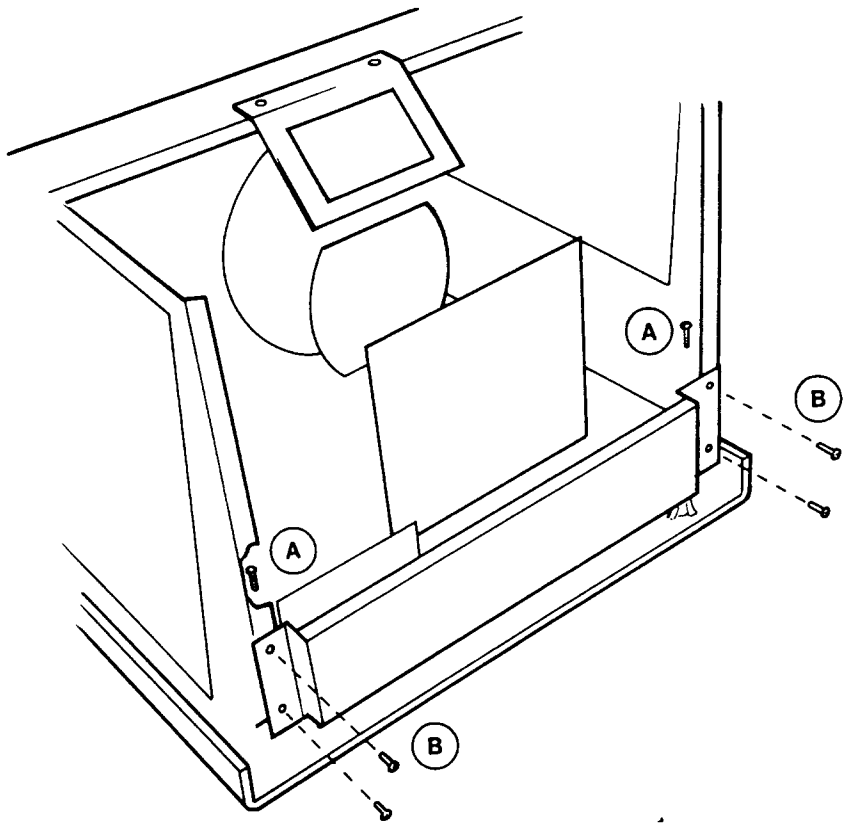


FIG F3 F SERIES MAIN CHASSIS ACCESS

CHASSIS ASSEMBLY/REMOVAL

To detach the front moulded fascia assembly complete with CRT, from the main chassis assembly (e.g. for picture tube removal/replacement):

1. Discharge the tube. See SAFETY STANDARDS Section.

2. Unplug interconnections as necessary.

3. Place the monitor face downwards on suitable padded blocks (as for CRT removal/replacement details following).

4. Refer to Figure F1, F Series Cabinet: Exploded View.

a) Unscrew fixing screw locating into the screwed bush at the top left-hand Stabilizer Bracket fixing point, item (7).

b) Remove the two fixing Screws securing the R/H front of the Chassis Main Frame, item (4) to the Customer Controls Bracket, item (6).

5. Refer to Figure F2, F Series: Cabinet Fixing Screw Locations.

a) Support the Chassis Main Frame. Remove three fascia/base fixing screws (D).

b) Separate carefully the Front Moulding and Chassis Main Frame.

6. Re-assemble in reverse order.

N SERIES CABINET ASSEMBLY (12 INCH MODELS)

The N Series cabinet is mainly an all metal construction.

CABINET COVER REMOVAL (Figure N1)

1. Remove the mains supply lead from the power point.
2. Unplug all connecting leads from the monitor.
3. Remove the five fixing screws (A).
4. Slide the cover towards the rear.
5. Lift the cover off.

SERVICE ACCESS (Figures N2, N3)

The side PCBs may be tilted to service Access positions as shown in Figs N2, N3.

1. Remove the fixing screws.
2. Lift the panel (B) (Fig N2).
3. Tilt the panel (D) (Fig N3) and engage the lower tabs (C) in the main chassis slots.

Reassembly is the reverse of the above process.

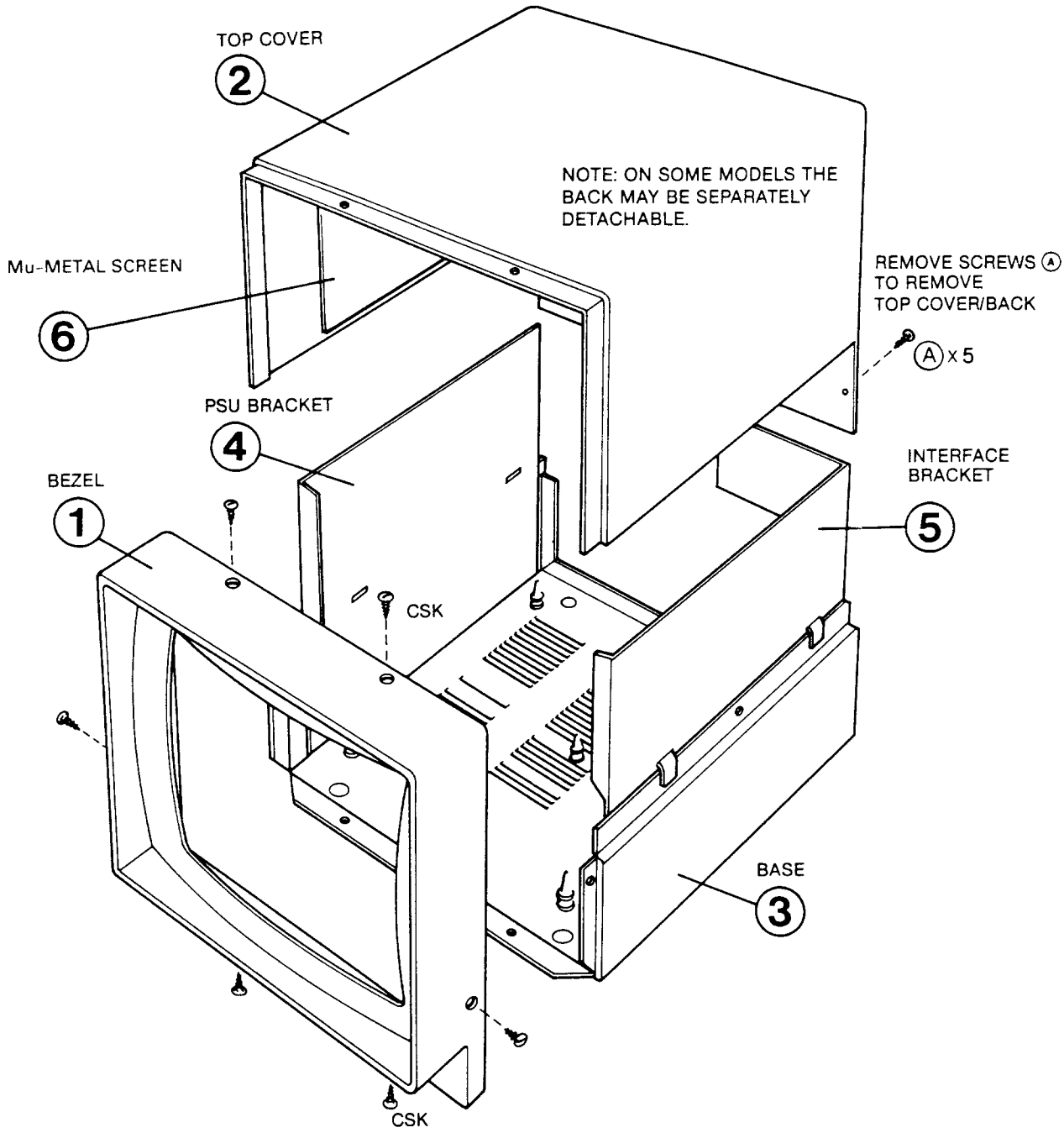


FIG N1 N SERIES EXPLODED VIEW

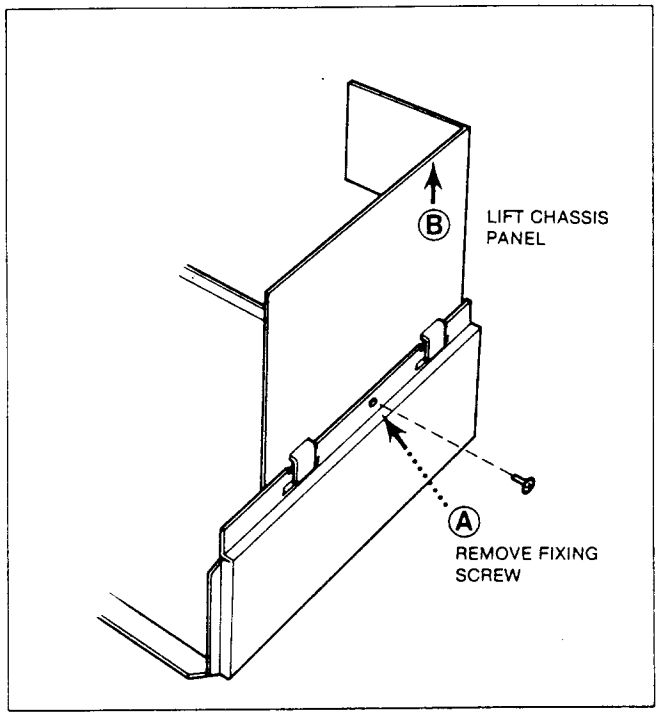


FIG N2 N SERIES FIXED POSITION

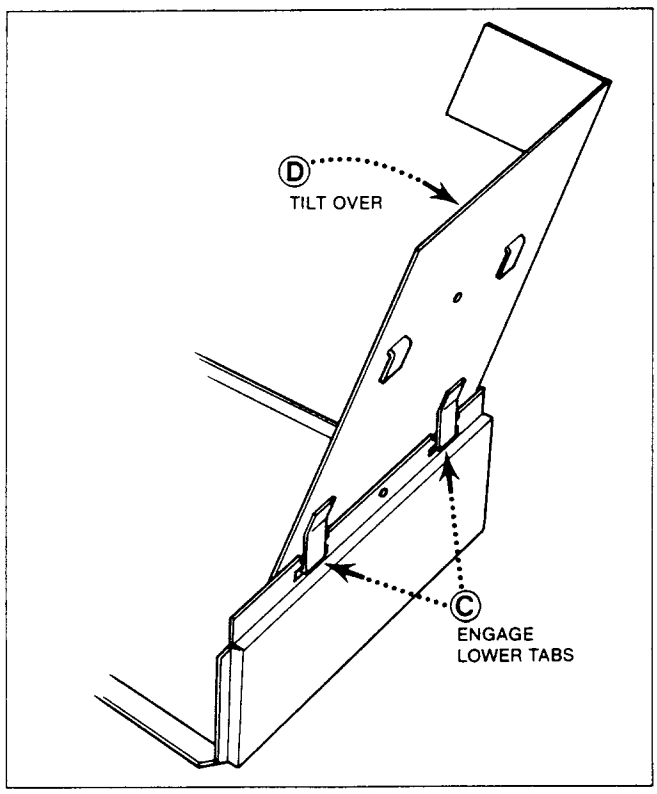


FIG N3 N SERIES SERVICE POSITION

R SERIES CABINET ASSEMBLY (12 INCH MODELS)

The R series cabinet assembly is a composite metal and injection-moulded parts construction.

A general view of the cabinet assembly and exploded view of the chassis construction is shown in Figure R1, R Series Cabinet Assembly.

CABINET COVER REMOVAL (Figure R1)

1. Remove the main supply lead from the power point.
2. Unplug all connecting leads from the monitor.
3. Remove five fixing screws (A). See Illustration, R Series Cabinet Assembly.
4. Slide the cover towards the rear.
5. Spring the cover out at the sides to disengage the tabs (C).
6. Lift the cover off.

SERVICE ACCESS (Figure R2, R3)

The side PCBs may be tilted to Service Access positions as shown in Figures R2, R3.

1. Remove the fixing screws (A) (fig R2).
2. Lift the panel (B) (Fig R2).
3. Tilt the panel (D) (Fig R3) and engage the lower tabs (C) in the main chassis slots.

Reassembly is the reverse of the above process.

SERIES 7 MK2: SERVICE ACCESS

For Service Manuals
MAURITRON SERVICES
8 Cherry Tree Road, Chinnor
Oxfordshire, OX9 4QY.
Tel (01844) 351694
Fax (01844) 352554
email:- mauritron@dial.pipex.com

Key	Description
1	Front (clip-on plastic moulding)
2	Front Chassis (plastic moulding)
3	Handle Support Bracket
4	Handle
5	Support Bracket (L/H and R/H)
6	Top Cover
7	Base
8	Mu-Metal Shield

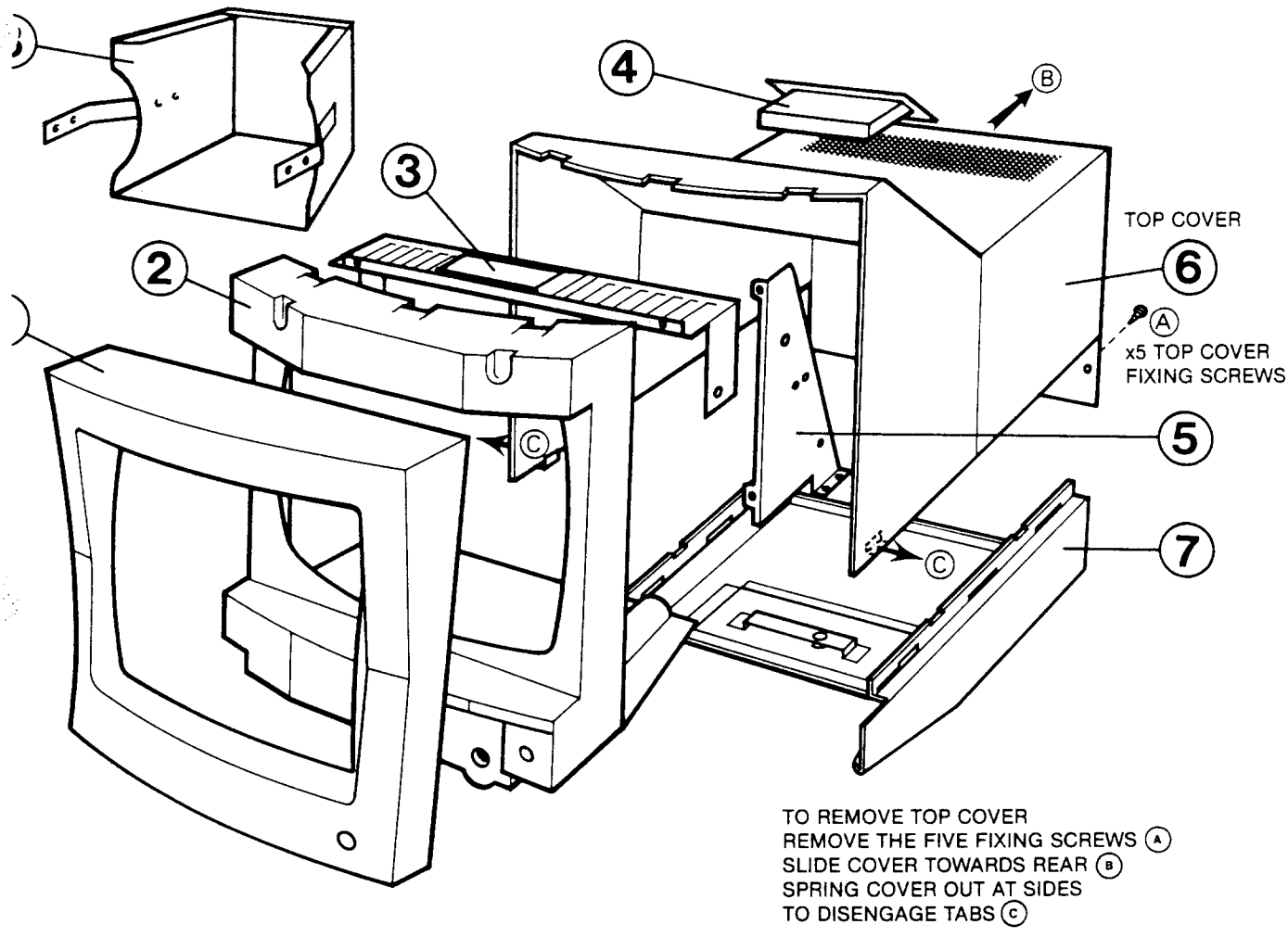


FIG R1 R SERIES EXPLODED VIEW

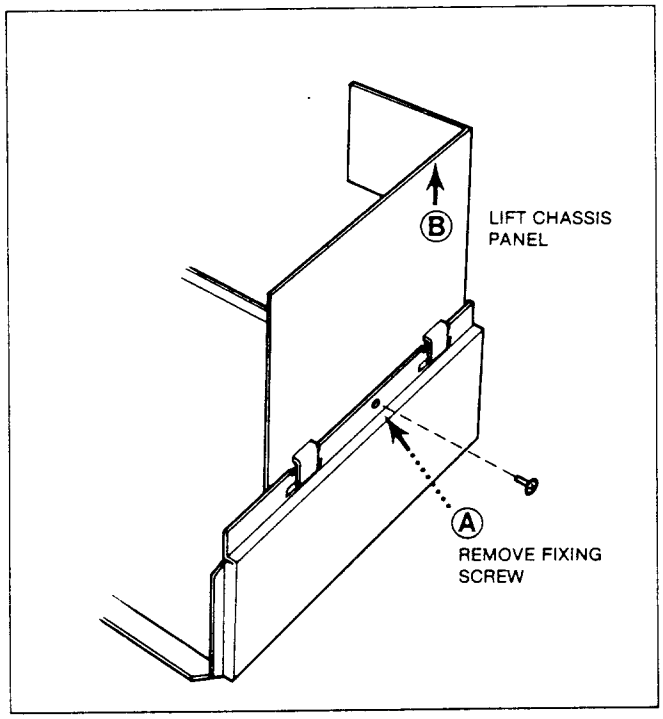


FIG R2 R SERIES FIXED POSITION

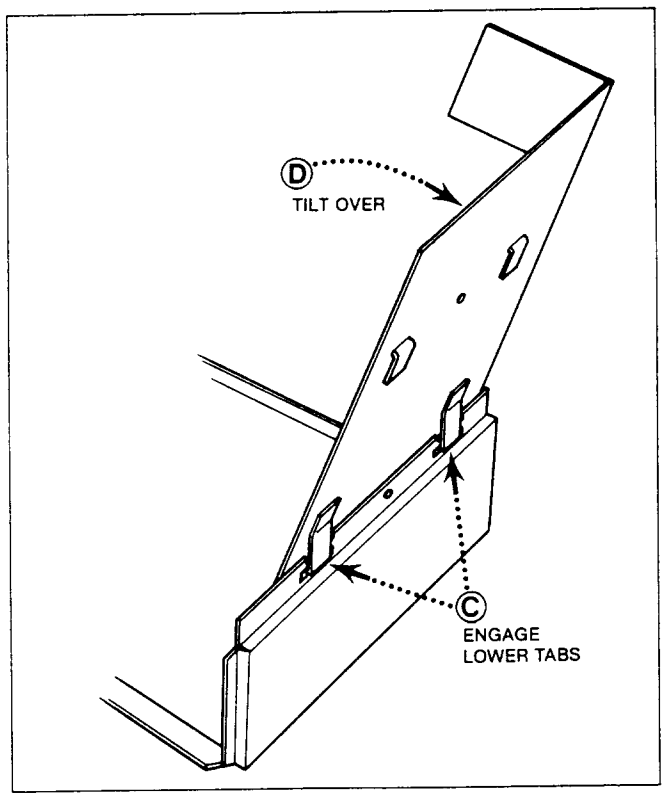


FIG R3 R SERIES SERVICE POSITION

T SERIES CABINET: (14 INCH MODELS)

The T Series cabinet assembly is a composite metal and injection moulded parts construction.

A general view of the cabinet assembly and exploded view of the chassis construction is shown in Figure T1, T Series Cabinet: Exploded View.

CABINET COVER REMOVAL

1. Remove the mains input lead from the power point. Unplug all connecting leads from the monitor.

2. Refer to Figure T2, T Series: Fixing Screw Locations.

a) Remove: 2 x Fixing Screws (A) from Cabinet Base

2 x Fixing Screws (B) from Cabinet Cover sides

2 x Fixing Screws (C) from Cabinet Cover back

b) Withdraw cabinet cover upwards to clear assembly and to provide service access.

3. Refer to Figure T1, T Series Cabinet: Exploded View for general construction and assembly details, and in relation to the notes following:

MAIN CHASSIS ACCESS

1. To provide service access to the Main Chassis and Drive/Deflection PCB, refer to Figure T3, T Series: Input Bracket.

a) Unscrew (one turn only) 2 x Fixing Screws (A) located on the bottom inside flange of the input Bracket.

b) Detach: 2 x Fixing Screws (B), from top ends of input Bracket securing bracket of chassis.

c) Release input Bracket by drawing rearwards to clear chassis assembly and provide access.

CHASSIS ASSEMBLY/REMOVAL

To detach the front moulded fascia assembly complete with CRT from the main chassis assembly (e.g. for picture tube removal/replacement etc):

1. Discharge the tube. See SAFETY STANDARDS section.

2. Unplug as required - interconnecting Lead assemblies/Wiring Harness connections, Tube Base, and EHT Connector, etc.

3. Place monitor face downwards on suitable padded blocks (as for CRT removal/replacement details following).

4. Refer to Figure T1, T Series Cabinet: Exploded View.

a) Unscrew fixing screw locating into the screwed bush at the top left-hand Stabilizer Bracket fixing point - item (7).

b) Remove: 2 x Fixing Screws - securing the R/H front of the Chassis Main Frame, item (4), to the Customer Controls Bracket, item (6).

5. Refer to Figure T2, T Series: Cabinet Fixing Screw Locations.

a) Support the Chassis Main Frame and remove 3 x fascia/base fixing screws (D).

b) Separate carefully the Front Moulding and Chassis Main Frame to provide direct access to Tube Fixing Points etc.

6. Re-assemble in reverse order to that listed.

SERIES 7 MK2: SERVICE ACCESS

Key	Description
1	Front Moulding - T2/IBM
2	Cover Moulding - T2/IBM
3	Base Moulding - T2/IBM
4	Main Chassis - Series 7/T2
5	Cross Brace Plate - Series 7/T2
6	Bracket - Customer Controls - Front - Series 7/T2
7	Bracket - Stabiliser M/F - Series 7/T2

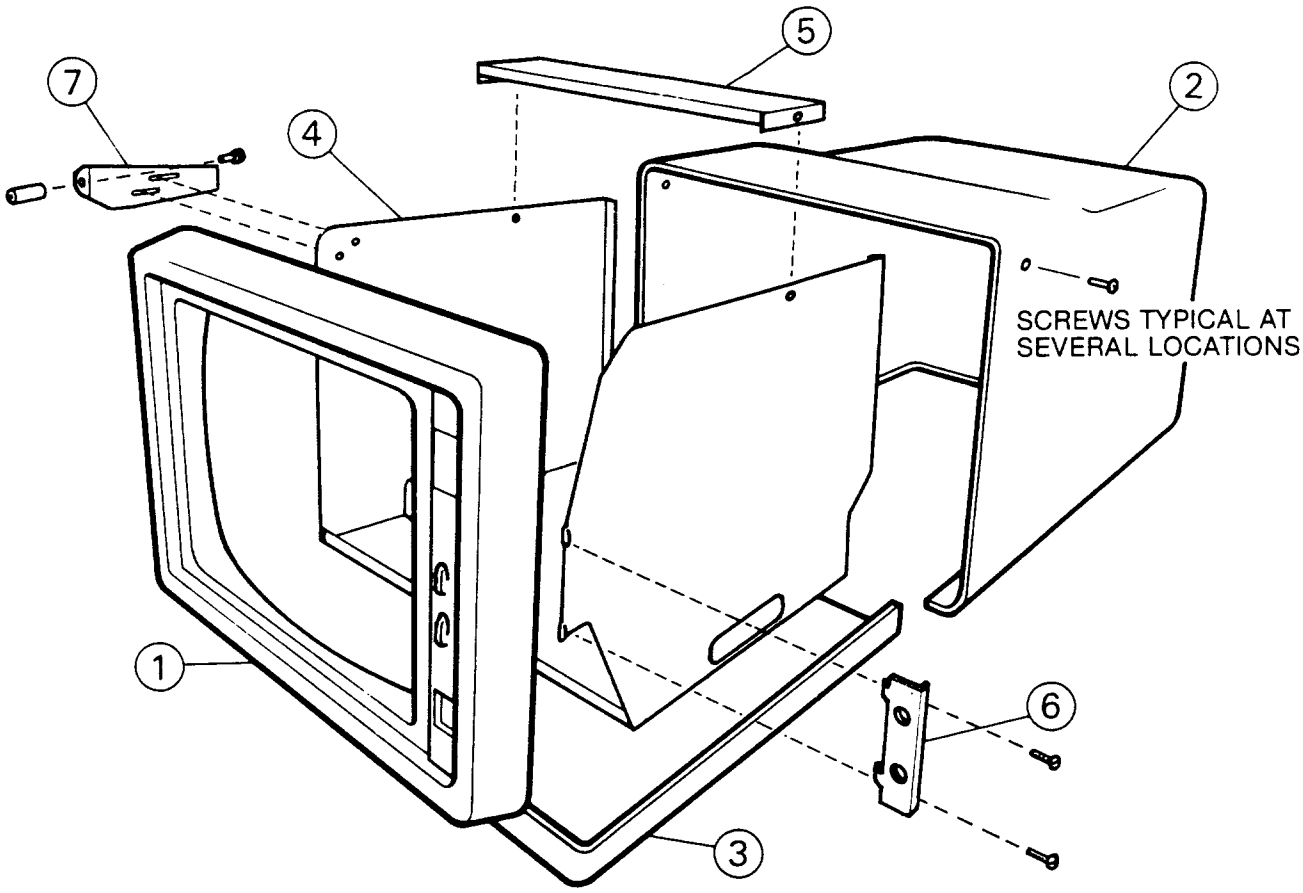


FIG T1 T SERIES EXPLODED VIEW

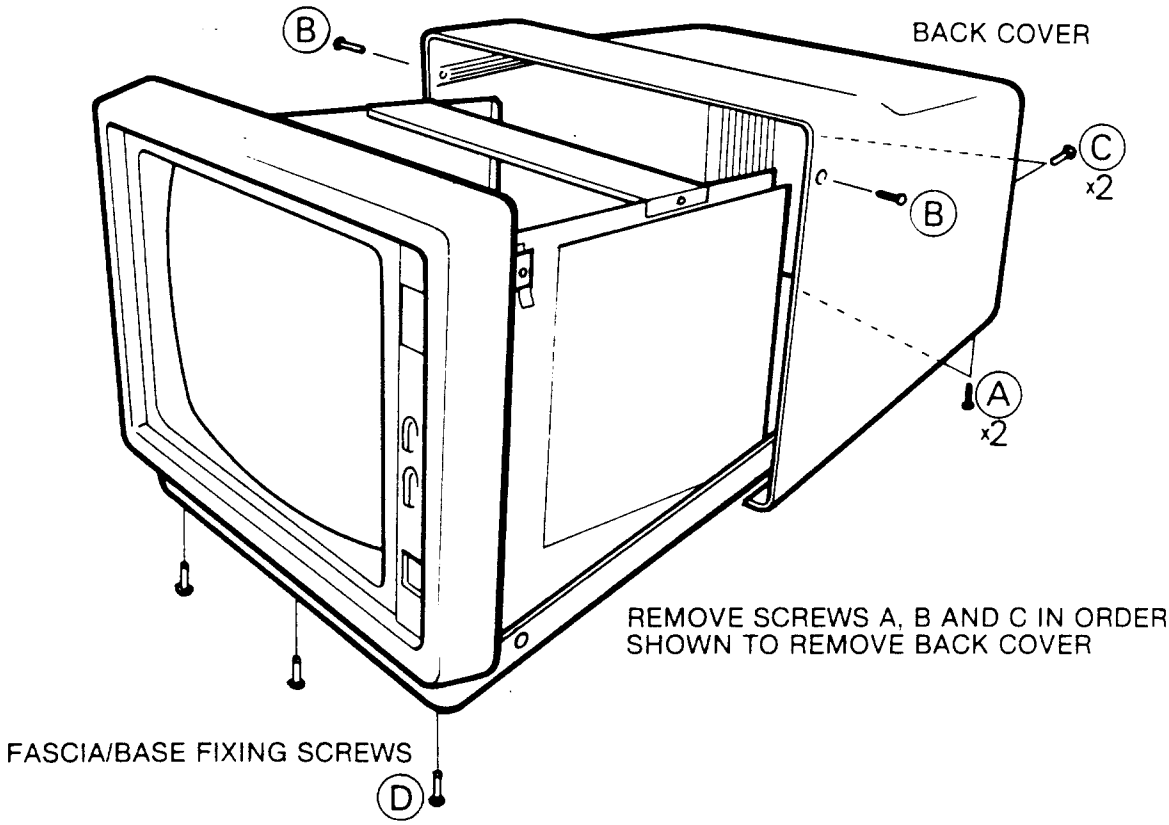


FIG T2 T SERIES FIXING SCREW LOCATIONS

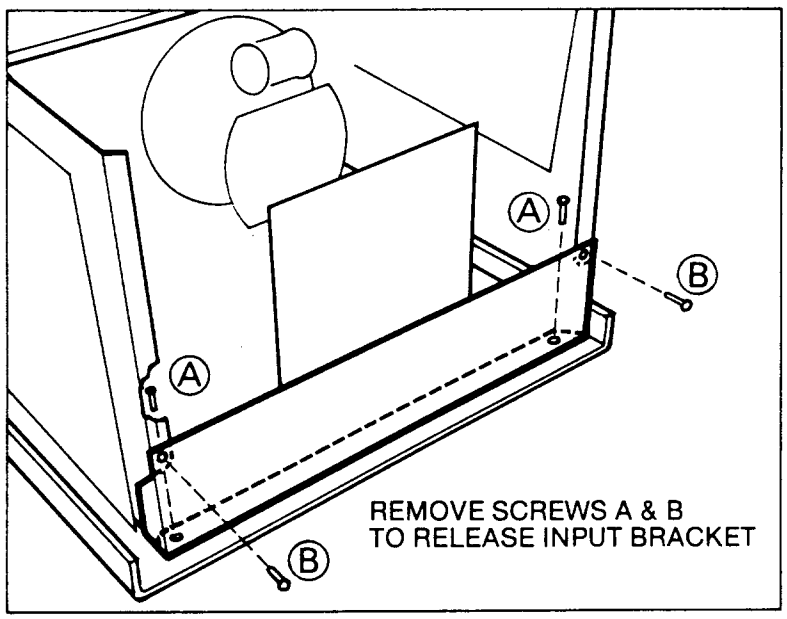


FIG T2 T SERIES INPUT BRACKET

SERIES 7 MK2: REMOVAL/INSTALLATION OF MAJOR ITEMS

WARNING

ENSURE THE MONITOR IS DISCONNECTED FROM THE MAINS ELECTRICAL SUPPLY BEFORE EFFECTING ANY OF THE FOLLOWING OPERATIONS.

DANGER

The tube stays charged to 25kV.

DISCHARGE THE TUBE BEFORE ATTEMPTING TO REMOVE THE EHT CAP (POPPY). See Safety Standards Section.

OBSERVE THE WARNING TO DELAY HANDLING THE CHASSIS FOR 30-60 SECONDS AFTER SWITCH-OFF.

PCB REMOVAL

Having gained access, as described in the Service Access Section, individual PCBs and the CRT may now be removed.

To remove any PCB or the CRT, unplug all relevant connectors (ensuring that it is known where to reconnect them, from connector idents and the relevant Interconnections Diagram).

PCBs are held in place by nylon self-locking support clips and in some cases by retaining screws. Remove any retaining screws and release in turn each of the support clips, lifting the PCB slightly for each one.

PCB REFITTING

Refit retaining screws and support clips. Refit connections in accordance with the Interconnections Diagram. In particular, ensure that all earth connectors are securely refitted.

CRT REMOVAL

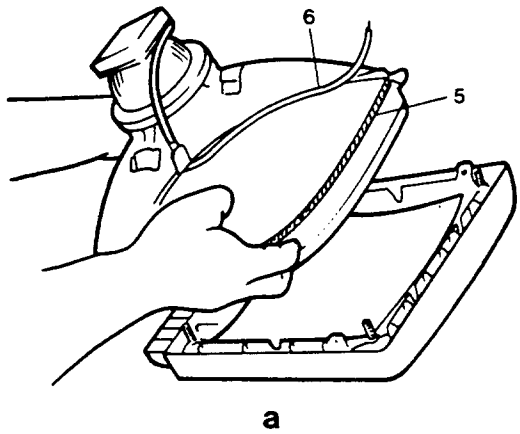
Having gained access, as described in the Service Access Section, the CRT may now be removed.

The monitor should be face down on suitably padded blocks. The EHT should have been discharged as described in the Safety Standards Section. If there is any doubt whether this has been done, then carry out the Discharge EHT procedure as follows:

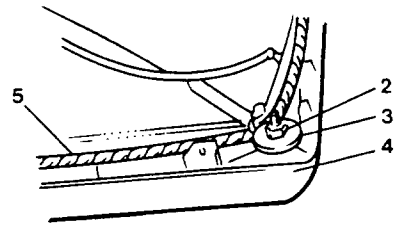
1. Using an EHT probe, connect the CRT dag coating to the tube final anode.

2. Disconnect the EHT lead from the CRT final anode and connect it to the chassis metalwork.

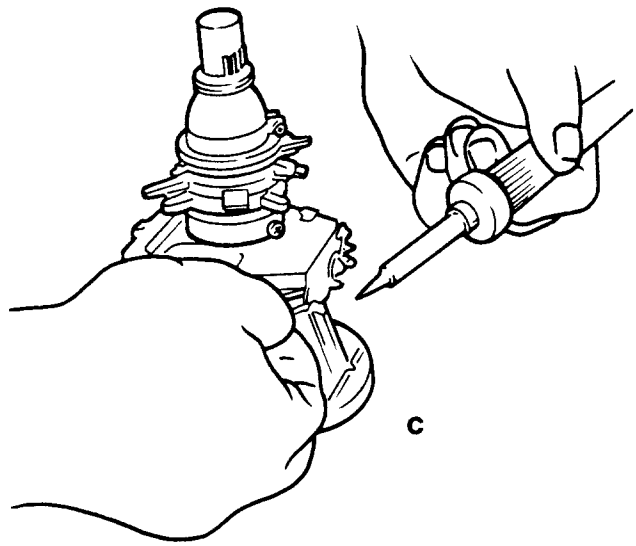
3. With EHT earthed, disconnect the Tube Base PCB from the tube base. Unplug the CRT earth braid lead from the dag earth braid pin on the Tube Base PCB.



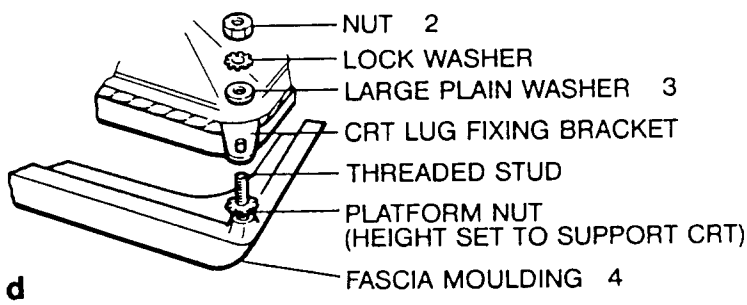
a



b



c



d

FIG 1 CRT REMOVAL/INSTALLATION

4. Referring to Figure 1, CRT Removal/Installation, remove the four nuts and four lock washers (2) and the four larger washers (3) securing the CRT to the cabinet fascia (4) (Figure 1b).

5. Carefully withdraw the CRT vertically. Be careful not to disturb the height settings of the platform nuts supporting the CRT.

6. Transfer degauss coil (5) and earthing braid (6)

(Figure 1a) and scan coil lead assembly (7) (Figure 1c) to the new CRT (Figure 2c). When fitting the new CRT, ensure that the height of the platform nuts is set correctly, so that the CRT is supported by all four lug fixing brackets (Figure 2d).

IMPORTANT

Do not disturb the tube neck components. These have been set for optimum performance during manufacture and are an integral part of the tube system.

7. CRT installation safety checks:

a) Check for correct fitting of CRT earthing braid item 6 in Figure 1a.

b) Ensure black lead from CRT earth braid to tube base is connected.

c) Check P band earth has been reconnected.

LINE OUTPUT TRANSISTOR TR 217

REMOVAL

1. Remove the transistor retaining spring clip from the heat-sink assembly.

2. Unsolder base, emitter and collector connections from main PCB and withdraw the transistor vertically.

NOTE

This transistor is a fully isolated device.

REPLACEMENT

1. Reassemble in reverse order with a suitable coating of heat sink compound between transistor and heat sink.

S CORRECTION : DARLINGTON SWITCH TRANSISTOR TR 218

REMOVAL

1. Remove the transistor retaining clip from the heat sink and retain carefully the thermal conducting and isolating pad.

2. Unsolder base, collector and emitter connection from PCB and withdraw transistor vertically.

REPLACEMENT

Reassemble in reverse order.

CAUTION

The thermal conducting/isolating pad MUST be in a position to isolate the transistor from the heat sink.

Failure to observe this point could damage the monitor.

B + OUTPUT TRANSISTOR TR 210

For removal/replacement see +12V Regulator subsection.

+12V REGULATOR IC 203

REMOVAL

1. Remove nuts, screws and washers retaining the heat sink to the Drive/Deflection and Panoramic Sync PCBs.

2. Unsolder the Regulator's three connecting leads from the PCB and withdraw it, complete with heat sink, vertically.

3. Remove screw, lock washer and nut retaining device to heat sink. Note order and sequence of fitting for reassembly.

REPLACEMENT

1. Replace in reverse order with a suitable coating of heat sink compound between device's heat conducting surface and the heat sink.

NOTE

Do not over-tighten the securing screw and nut.

EHT DIODE-SPLIT TRANSFORMER T200

REMOVAL

1. Discharge the final anode of the CRT to the earth braid.

2. Disconnect the EHT lead cap connector from the CRT.

3. Remove the soldered connections of OV, Screen (A1), and Focus lead from the Tube Base PCB Assembly.

To disconnect the Focus lead from the Tube Base socket, first prise off the insulating cap, taking care not to damage the cap or base.

4. Unsolder connections on the Drive/Deflection PCB, located on the underside of T200, using a suitable desoldering tool.

5. When all soldered connections are cleared, unlatch, in turn, the three moulded-on retaining lugs on T200, from their engagement with the retaining holes in the PCB. Finally, withdraw T200 upwards from the PCB.

REPLACEMENT

Replace in reverse order.

1. When replacing T200, ensure all soldered connections are smoothly contoured and kept short in order to guarantee correct EHT function and adequate voltage clearance.

2. Finally, when replacement is complete, reconnect the EHT connector cap to the CRT, check and switch on. Then readjust Focus and Screen (A1) preset controls for optimum settings.

(See appropriate Sections in this Manual on FACTORY PRESET ADJUSTMENTS).

SERIES 7 MK2: PRESET CONTROLS AND ADJUSTMENTS

INTRODUCTION

This section is in two parts:

(1) Presets for the Basic Model.

(2) Presets for Additional Features.

In each part, preset controls are divided into two categories, Factory Presets and User Presets.

FACTORY PRESETS

These presets are set up in the factory and should not normally require readjustment. They are not accessible without removing the monitor cover. Adjustment procedures are given together with details of test equipment required.

USER PRESETS

These presets enable adjustments of the display and other minor adjustments. They are accessible without removing the monitor cover.

PRESET CONTROLS AND ADJUSTMENTS : BASIC MODEL.

USER PRESETS

All User Preset controls are accessible without removing the Monitor cover, either from the front or from the rear of the Monitor.

WARNING

TO PROTECT AGAINST THE RISK OF ELECTRIC SHOCK, AND TO PROTECT THE MONITOR, USE ONLY AN INSULATED NON-METALLIC TRIMMING TOOL TO ADJUST THE PRESET CONTROLS.

The User Presets are as follows:

HEIGHT	Rotary
WIDTH	Rotary
V SHIFT (Vertical Shift)	Rotary
H SHIFT (Horizontal Shift)	Rotary
MODE SELECT	Slide switch:4BIT/6BIT/AUTO
VIDEO SOURCE SELECT : Either	Slide switch:ANALOG/TTL
Or	Rotary switch: AUX1/AUX2/ANALOG/TTL

SERIES 7 MK2: PRESET CONTROLS AND ADJUSTMENTS

USER CONTROLS

In addition to the User Preset controls, there are the following User Controls (not preset).

POWER ON/OFF	Switch
BRIGHTNESS	Rotary
CONTRAST	Rotary

FACTORY PRESETS

Factory Presets are accessible when the Monitor cover has been removed. (See the sections Service Access and Safety Standards in this manual).

WARNING

UNDER NO CIRCUMSTANCES SHOULD ACCESS BE OBTAINED OR PRESETS BE ADJUSTED BY ANYONE OTHER THAN A QUALIFIED ENGINEER.

WARNING

TO PROTECT AGAINST THE RISK OF SHOCK, AND TO PROTECTTHE MONITOR, USE ONLY AN INSULATED NON-METALLIC TRIMMING TOOL TO ADJUST THE PRESET CONTROLS.

The Factory Presets are as follows:

SWITCHED MODE POWER SUPPLY PCB.

SET HT: VR1 This is set to give + 137V HTwhen measured with a dark screen. It must not be readjusted.

CAUTION

FAILURE TO COMPLY MAY INVALIDATE THE WARRANTY.

DRIVE/DEFLECTION PCB

SET EHT: VR202 (Fig 1) This is set to give an EHT volt-age as listed, when measured between the CRT EHT cap and chassis. It must not be readjusted.

CAUTION

FAILURE TO COMPLY MAY INVALIDATE THE WARRANTY.

The functions of each set of four controls are:

V.SHIFT	Provides a vertical shift to the display.
HEIGHT	Adjusts the height of the display.
WIDTH	Adjusts the width of the display.
H0	Adjusts the position of the video relative to horizontal line scan.

The controls are:

	4 Bit TTL	6 Bit TTL	ANALOGUE
V.SHIFT	VR566	VR571	VR632
HEIGHT	VR567	VR572	VR633
WIDTH	VR568	VR573	VR631
H0	VR570	VR574	VR630

See Alignment Procedures in this section.

MODE HEIGHT (IBM-PGA Mode): VR774. (Not fitted on all models) This control provides additional height adjustment when the Monitor is configured for IBM PGA text emulation (400 lines). It is brought into operation by setting the link on PL518 to connect pins 1 and 2.

ALIGNMENT PROCEDURES

The preset controls described following are set-up at the factory using Standard Test Patterns and Alignment Procedures during manufacture.

IMPORTANT

Any re-adjustment of these preset controls will require the use of suitable test equipment and the correct alignment procedures being followed if the correct settings are to be obtained.

EQUIPMENT REQUIRED

Test equipment should include:

1. Oscilloscope with a 20MHz minimum bandwidth, and with 20V/Division Calibration.

2. Suitable 10X and 100X probes for Waveform/Voltage measurements.

3. Suitable Pattern/Signal Generator or Signal/Test Pattern source - as defined in the alignment procedures following.

SERIES 7 MK2: PRESET CONTROLS AND ADJUSTMENTS

MODE & SOURCE SELECTOR SWITCH SETTINGS

Because of the number of preset controls, it is advisable to ensure that the correct settings for signal Mode and Source have been made, before making any adjustments.

Selector switches to check are:

a) Video Source Select Switch : located on front or rear of monitor.

b) Mode Select Slide Switch : switch located on the rear of the monitor, 4 Bit, 6 Bit, Auto, etc.

PRESET ADJUSTMENTS

Refer to the diagrams listed when making adjustments to the presets described in the following procedures.

Series 7 Mk 2 Tube Base PCB Measurement Points : Fig 2

Series 7 Mk 2 Video Output Stages Specification: Fig 3, Fig 4, Fig 5 and Fig 6.

1.0 OPERATING POINT (Tube Base PCB Assembly)

1. Select analogue inputs and display suitable Colour Scales pattern.

2. Set Contrast control to maximum. Set Brightness control to maximum.

3. Probe Operating Point shown on Fig 2 with CRO.

4. With preset VR904 (Op.Point), set operating points to measure 90V +/-2V black level as shown in Fig C.

2.0 BLACK LEVELS (Tube Base PCB Assembly)

Select analogue inputs and display suitable Colour Scales test pattern.

Adjust CONTRAST control to maximum and set BRIGHTNESS control to minimum.

Probe Red I/P, Green I/P, and Blue I/P points shown in Fig 2.

Using preset controls: VR901 (Red Black level)
VR902 (Green Black level)
VR903 (Blue Black level)

Adjust respective Black levels to measure 110V +/- 2V, as shown in Fig 5.

This provides the starting point for Grey-Scale tracking adjustments.

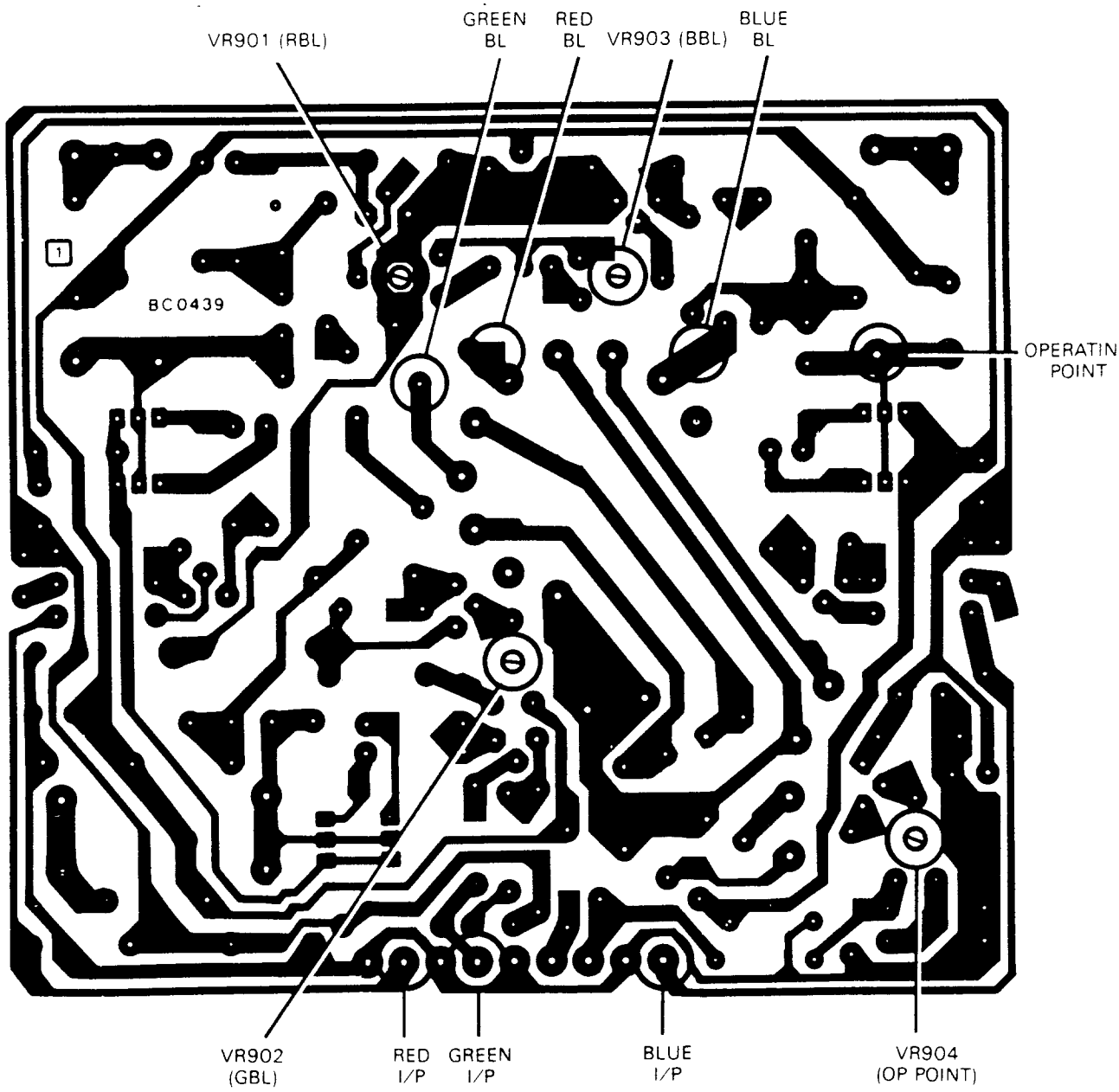


FIG 2 SERIES 7 MK2 TUBE BASE PCB MEASUREMENT POINTS

3.0 VIDEO GAINS (Interface PCB Assembly)

Video Gain Presets are adjusted in the factory using standard test signals. If there is any need to readjust these settings in the field (e.g. after change of CRT) the following procedures should be used.

Preliminary Control Settings

1. Set CONTRAST control fully clockwise to maximum setting.

2. A1 (Screen) Preset (Located on Diode-Split EHT Transformer). Turn this control anti-clockwise to ensure the Beam Limit Circuit will not operate.

Analogue Settings

1. Select Analogue input and with controls set as 1 and 2 above.

2. Apply input signals of 0.7V Black-To-White levels (e.g. Grey-Scale Staircase signal).

3. Probe with CRO the R,G and B input points on the Tube Base PCB Assembly, shown in Fig 2, Tube Base PCB Measurement Points.

4. Adjust the appropriate ANALOGUE GAIN presets located on the Interface PCB Assembly:

VR603 - Analog Red Gain

VR604 - Analog Green Gain

VR605 - Analog Blue Gain

These presets should be adjusted to provide 2.4V Black- To-White levels, as shown in Fig 3, when measured at their respective test points.

TTL Settings

1. Remove Analogue inputs.

2. Select TTL inputs and apply R, G, B, TTL test signals (Fig 3).

3. Adjust the appropriate TTL GAIN presets located on the interface PCB Assembly:

VR531 - TTL Red Gain

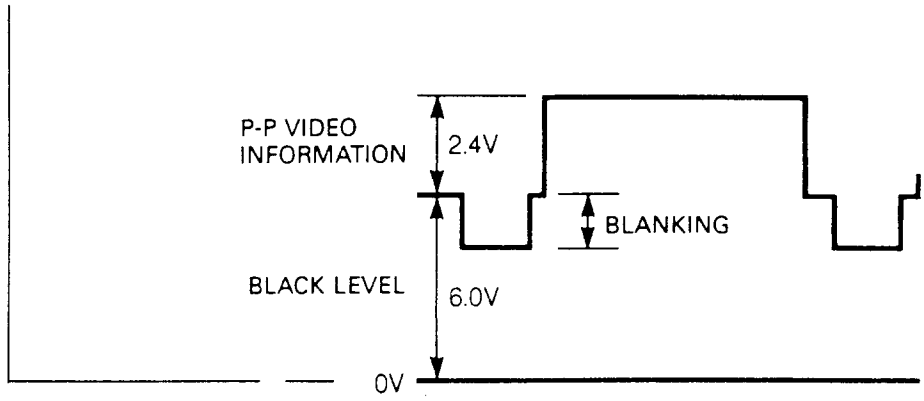
VR528 - TTL Green Gain

VR533 - TTL Blue Gain

These presets should be adjusted to provide 2.4V Black-To-White levels, as shown in Fig 3, when measured with the CRO at the respective R, G, and B input points - shown in Fig 2 on the Tube Base PCB Assembly.

SERIES 7 VIDEO OUTPUT STAGE SPECIFICATION

Input Signal R, G and B



Positive going video, clamped to D.C. pedestal incorporating line and field blanking information.

BLACK LEVEL	— 6V NOMINAL
LINE/FIELD BLANKING	— 2V NOMINAL (W.R.T. BLACK LEVEL)
P-P VIDEO INFORMATION	— 2.4V NOMINAL FOR 44V P-P CATHODE DRIVE
INPUT SIGNAL BANDWIDTH	— 40MHz TYPICAL
INPUT IMPEDANCE	— 75Ω W.R.T. BLACK LEVEL BIAS POTENTIAL

Fig. 3

Video Output Amplifier
DC Operating Point — SET BLACK LEVEL TO 90V AT BF585 COLLECTORS

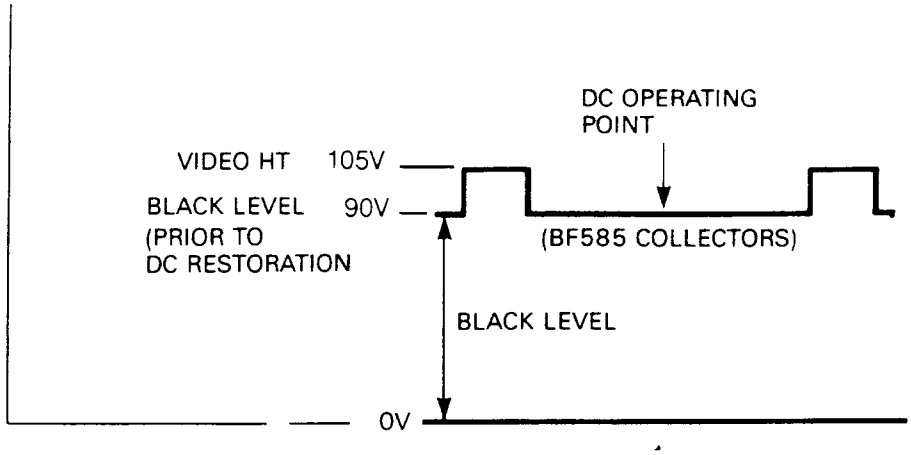


Fig. 4

SERIES 7 VIDEO OUTPUT STAGE SPECIFICATION

Video Output Amplifier
Black Level Setting at CRT cathodes

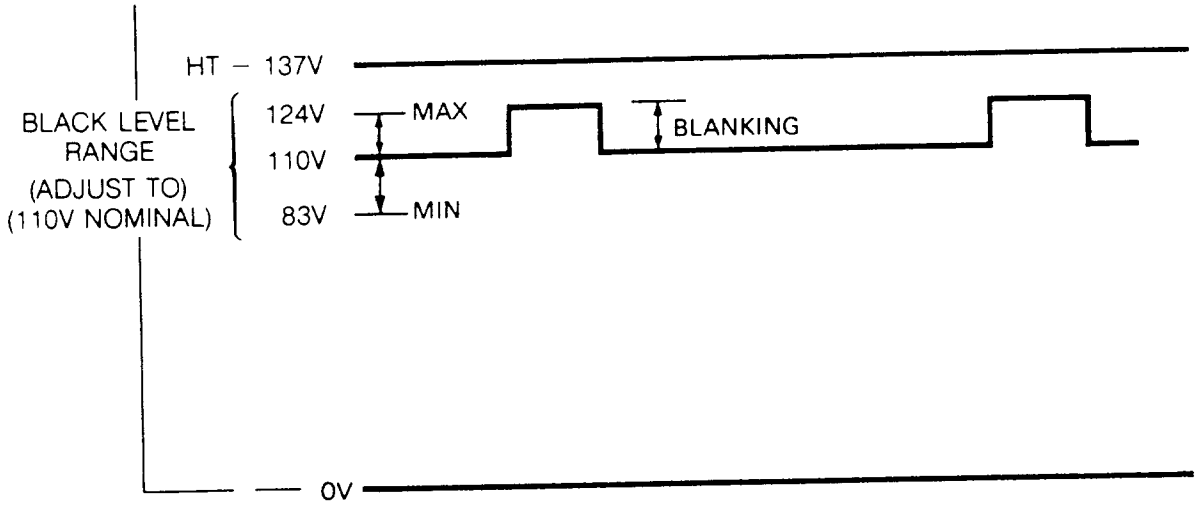


Fig. 5

Video Output Amplifier
Gain Setting

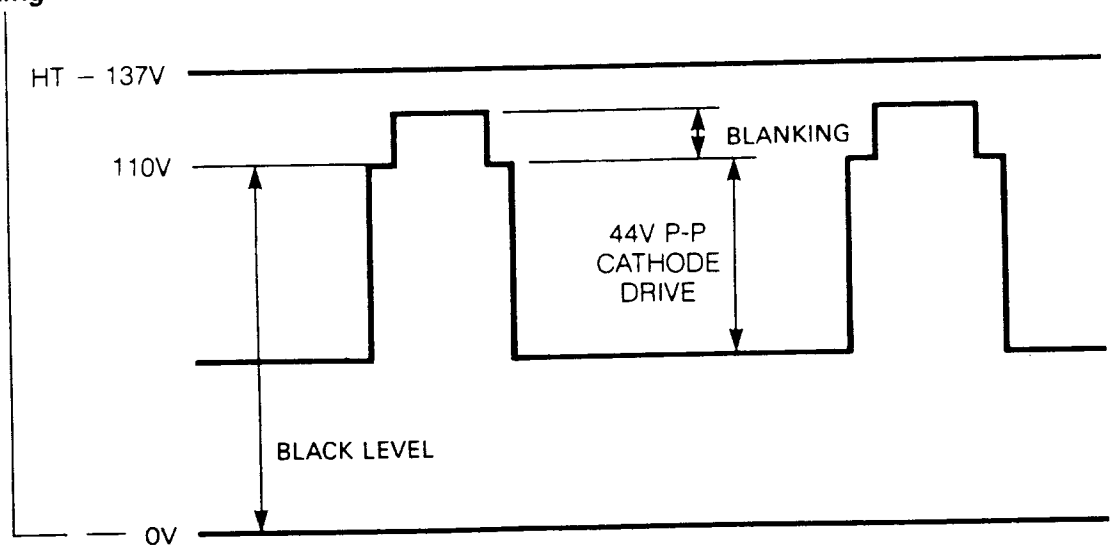


Fig. 6

4.0 GREY SCALE TRACKING ADJUSTMENTS

NOTE

The adjustments described in the preceding sections (1.0 Operating Point, 2.0 Black Levels and 3.0 Video Gains) MUST be carried out in full and in the order listed, before attempting the Grey Scale Tracking Adjustment now described.

Analogue Settings (Grey Scale)

Select Analogue inputs and supply with a suitable Grey Scale test pattern.

1. Set the USER BRIGHTNESS control to the centre of its adjustment range.

2. Set the CONTRAST control to maximum.

3. Adjust the A1 (Screen) preset control on the Diode-Split EHT Transformer (T200) so that the background raster is just cut-off.

Using presets located on the Tube Base PCB:

1. Adjust only the two presets:

VR 901 - RBL (Red Black Level)

VR 903 - BBL (Blue Black Level)

to match a Standard Grey Scale at levels near to Black.

2. If necessary, readjust the A1 control to just cut off the raster.

Using preset controls located on the Interface PCB:

1. Adjust only the two Analogue presets:

VR603 A/R GN (Analog Red Gain)

VR604 A/B GN (Analog Blue Gain)

to match a Standard Grey Scale at peak white levels, or to set the desired white colour.

TTL Settings (Grey Scale)

Remove the signals to the Analogue inputs:

1. Select TTL Input and apply signals to the TTL Input Socket Connector.

2. Signals applied must contain a suitable peak white area.

Using presets located on Interface PCB:

1. Adjust only the two TTL presets:

VR531 - TTL/R GN (TTL Red Gain)

VR533 - TTL/B GN (TTL Blue Gain)

to match a Standard Grey Scale at peak white levels, or to set the desired white colour.

5.0 PICTURE GEOMETRY SETTINGS

IMPORTANT

Before adjusting the internal (Factory) Picture Geometry preset controls, note that the User preset controls on the monitor are normally centred first.

With the User preset controls centred, adjust each set of Factory preset controls as necessary to make the picture fit the screen:

4 BIT

Set the 4BIT/6 BIT/ANAL switch to 4 BIT.

Set the ANAL switch to TTL.

Adjust the 4 BIT TTL picture geometry controls.

6 BIT

Set the 4BIT/6 BIT/ANAL switch to 6 BIT.

Set the ANAL/TTL switch to TTL.

Adjust the 6 BIT TTL picture geometry controls.

ANALogue

Set the 4BIT/6 BIT/ANAL switch to ANAL.

Set the ANAL/TTL switch to ANAL.

Adjust the analogue picture geometry controls.

PRESET CONTROLS AND ADJUSTMENTS: ADDITIONAL FEATURES

USER PRESETS

All User Preset controls are accessible without removing the Monitor cover, either from the front or from the rear of the Monitor.

WARNING

TO PROTECT AGAINST THE RISK OF ELECTRIC SHOCK, AND TO PROTECT THE MONITOR, USE ONLY AN INSULATED NON-METALLIC TRIMMING TOOL TO ADJUST THE PRESET CONTROLS.

FACTORY PRESETS

Factory Presets are accessible when the monitor cover is removed (See the sections, Service Access and Safety Standards in this manual).

WARNING

UNDER NO CIRCUMSTANCES SHOULD ACCESS BE OBTAINED OTHER THAN BY A QUALIFIED ENGINEER.

TO PROTECT AGAINST THE RISK OF SHOCK, AND TO PROTECT THE MONITOR, USE ONLY AN INSULATED NON-METALLIC TRIMMING TOOL TO ADJUST THE PRESET CONTROLS.

The presets listed here are in addition to those listed under Basic Model. They are only relevant to those models that incorporate the particular feature to which they relate. See Table 2 in the Introduction, which lists the Additional Features for each model.

PS2/DIFFERENTAL INPUT PCB

If a PS2/Differential Input PCB is replaced, then the following adjustments are likely to be required on this PCB.

R PS2 GAIN	VR404
G PS2 GAIN	VR405
B PS2 GAIN	VR406
WIDTH	VR408
H PHASE	VR410
HT1	VR411
HT2/3	VR409
V SHIFT	VR407

It is also worth checking the settings of the analogue R, G, B gains (VR603, VR604, VR605) on the Interface PCB. See Basic Model, Alignment Procedures, in this section.

If an Interface PCB needs to be changed, the presets on this PCB should also be checked, and if necessary, adjusted.

ALIGNMENT PROCEDURES

R, G, B PS2 GAIN. Apply input signals of 0.7V Black- to-White level (for example, Grey Scale Staircase signal) to the PS2/TTLinput, and switch the PS2/TTL switch (SW402) to PS2.

Monitor with a CRO at the Green Input (Fig 2).

Adjust G PS2 GN (VR405) to give 2.4V Black-to-White as shown in Fig 3.

Assuming that the Grey Scale tracking adjustments have already been done (see Basic Model, Greyscale Tracking Adjustments), the R and B PS2 GAIN presets may now be adjusted.

Adjust R PS2 GAIN (VR404) and B PS2 GAIN (VR406) to match a Standard Greyscale at Peak White levels, or to set a desired white colour.

For the remainder of the presets, use PS2 Test Patterns from a PS2 computer.

HT1(VR411) and HT2/3(VR409)

Set the computer to 640 X 480 format (mode 3) and adjust HT2/3 to give the required height.

Set the computer to 640 X 480 (mode 2) and check that the height and vertical position are within 3mm of the mode setting. DO NOT READJUST HT2/3.

Set the computer to 640 X 350 (mode 1) and adjust HT1 to match the height in mode 2.

DECODER PCB

If a Decoder PCB is replaced, the following adjustments are likely to be required on this PCB. The replacement of a Decoder PCB does not necessitate any adjustments on any other PCBs.

VR1P Horizontal Frequency Identification

Adjust VR1P so that the frequency measured on pin 4 of IC1P is set to 15.350 kHz +/-30Hz.

VR2P, L7P PAL Decoder Alignment

Select a PAL composite video test source with a pattern created to test PAL Decoders.

By observing the display, adjust VR2P for minimum Hanover bars over all the screen.

Adjust L7P to further minimise Hanover bars. Readjust VR2Pand L7p again as necessary.

VR3P Pedestal Adjustment

Examine the signal, as shown in Drawing no 5. Adjust VR3P so that the black level on the first two lines after the field pulse is the same as that over the rest of the field.

VR4/5/6/7P Height, Vertical Phase, Horiz Phase, Width

These are adjusted for the desired geometry on a 15 to 16 kHz line frequency analogue or composite video source.

VR8/9/10P Blue, Green and Red Gains

Adjust for 2.8V black to white on the Decoder outputs.

VR11P Decoder Black Level

Adjust VR11P so that the black levels from the Decoder are the same as those from the Interface PCB. (See Drawing 6).

TOUCHSCREEN PCB

No adjustments are permitted for the Touchscreen PCB. If it is thought to be in need of adjustment, it should be returned to the factory.

SERIES 7 MK2: INTERCONNECTIONS DIAGRAMS

INTERCONNECTIONS DIAGRAMS

GENERAL

For any model, wiring which connects external controls, external connectors, PCBs and the CRT, is all shown on one Interconnection Diagram.

This Section contains Interconnection Diagrams covering all the Series 7 Mk 2 models the diagrams are identified by Cabinet style and Drawing Number.

The following Table relates Model Numbers and Cabinet style to these Drawing Numbers, so that the diagram appropriate to a particular model may be selected.

Model number	Cabinet style	Interconnections Drawing number
12L72DNR1	N Series	GO1906
12L72DRR1	R Series	GO1906
12L71DNR1	N Series	GO1906
12L71DNS3	N Series	GO1906
14H727TS2E	T Series	GO1177
14H717TS2U	T Series	GO1177
20L718ES2	E Series	GO1907
20L728ES2	E Series	GO1907
20H718ES2	E Series	GO1907
20H728ES2	E Series	GO1907
604	F Series	GO1716
704	F Series	GO1716
705	F Series	GO1366

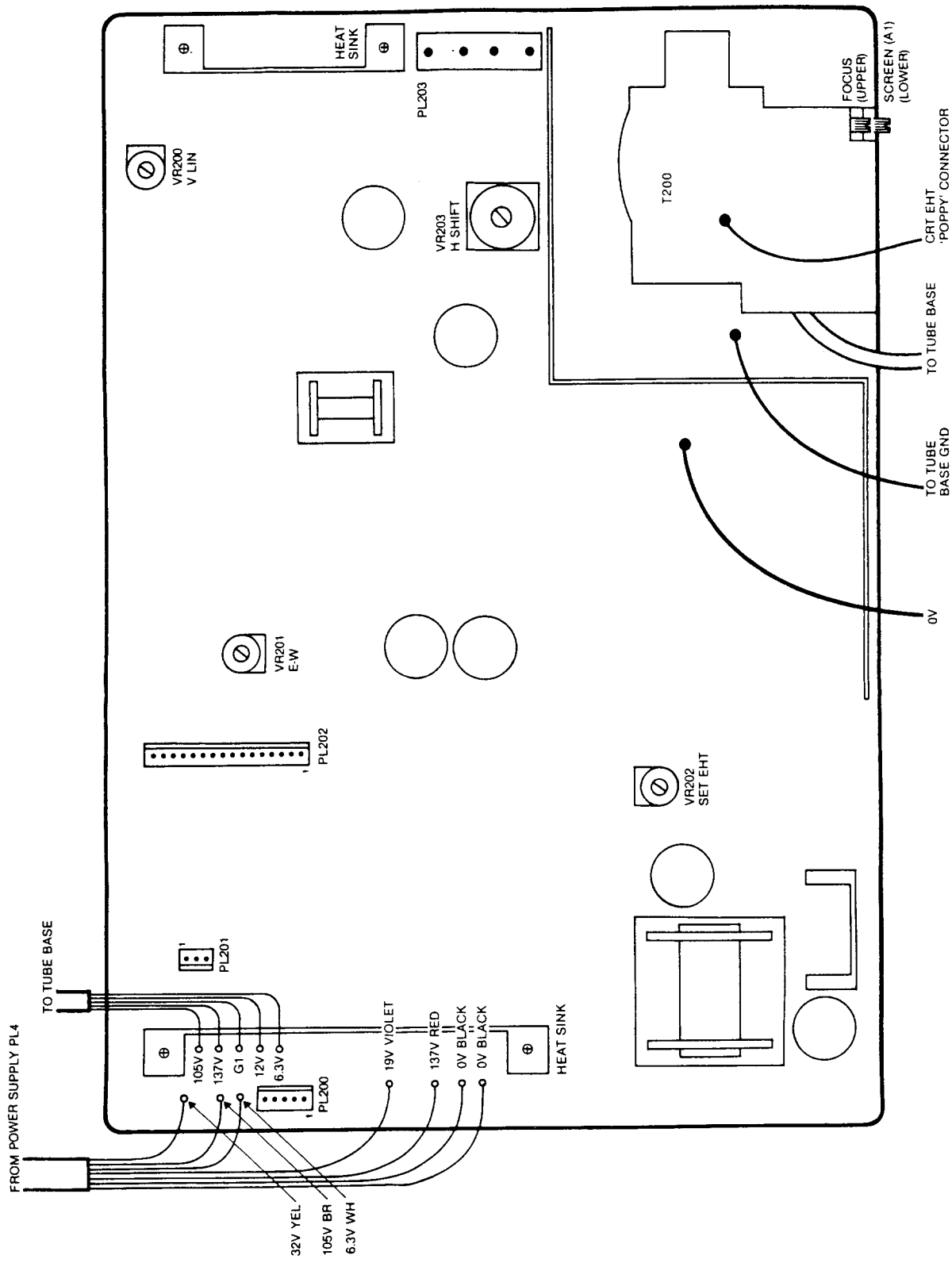


FIG1 DRIVE/DEFLECTION PCB

12 inch models	24KV at zero beam current
14	24KV at zero beam current
15	25KV at zero beam current
20	25KV at zero beam current

E-W (CORRECTION): VR201. Correct adjustment achieves a display with vertical edges (neither barrel nor pincushion distortion).

V. LIN (Vertical Linearity): VR200. Adjusted for vertical linearity, which is heat demonstrated using a cross-hatch display.

H. SHIFT (Horizontal Shift): VR203. Adjusted to centre the raster.

FOCUS (on the Diode Split Transforer T200). Adjustment is with BRIGHTNESS set at normal viewing level.

SCREEN (A1 VOLTS) (on the Diode Split Transformer T200). This determines the raster visibility cut off and is adjusted as part of grey-scale tacking.

See Alignment procedures in this section.

TUBE BASE PCB

OP (Operating Point, DC Level): VR904. Adjusted to set the operating points (quiescent DC level) of the Video Output Amplifiers. It is set to give 90V at the Black Level.

See Alignment Procedures in this section.

BLACK LEVEL: R(Red) BL, VR901: G(Green) BL, VR902: B(Blue) BL, VR903. Adjusted to give Black Levels of 110V on the R, B and G cathodes with respect to chassis.

See Alignment Procedures in this section.

INTERFACE PCB

VIDEO GAIN

(1) Analogue Gain:	A/R GN, VR603
	A/G GN, VR604
	A/B GN, VR605
(2) TTL Gain:	TTL/R GN, VR528
	TTL/G GN, VR531
	TTL/B GN, VR533

See Alignment Procedures in this section.

DISPLAY. A seperate set of four preset controls for the display is provided for each of the three video channels; 4 bit TTL, 6 bit TTL and anologue.

TABLE 3

MODEL VARIANTS

	Screen Size	Persistence	Series 7	Input Volts	Input Circuit	Cabinet Series	Cabinet Type	Cabinet Colour
Model No.	14	H	7	2	7	T	S	2
	14 inch	Standard	7	240V	7	T	Standard	P/W*
	14	H	7	1 110V	7	T	S	2
	12	L Long	7	2	D Diff i/p	N	R O.E.M.	1 Grey
	12	L	7	1	D	N	S	3 Black
	20	H	7	2	8	E	S	2
604, 704 705	15 inch FST	Med/Short	7	-	-	-	-	-

Key :

P/W	Pearl White
O.E.M	Outside Equipment Manufacture
FST	Flat Square Tube

For Service Manuals
MAURITRON SERVICES
8 Cherry Tree Road, Chinnor
Oxfordshire, OX9 4QY.
Tel (01844) 351694
Fax (01844) 352554
email:- mauritron@dial.pipex.com

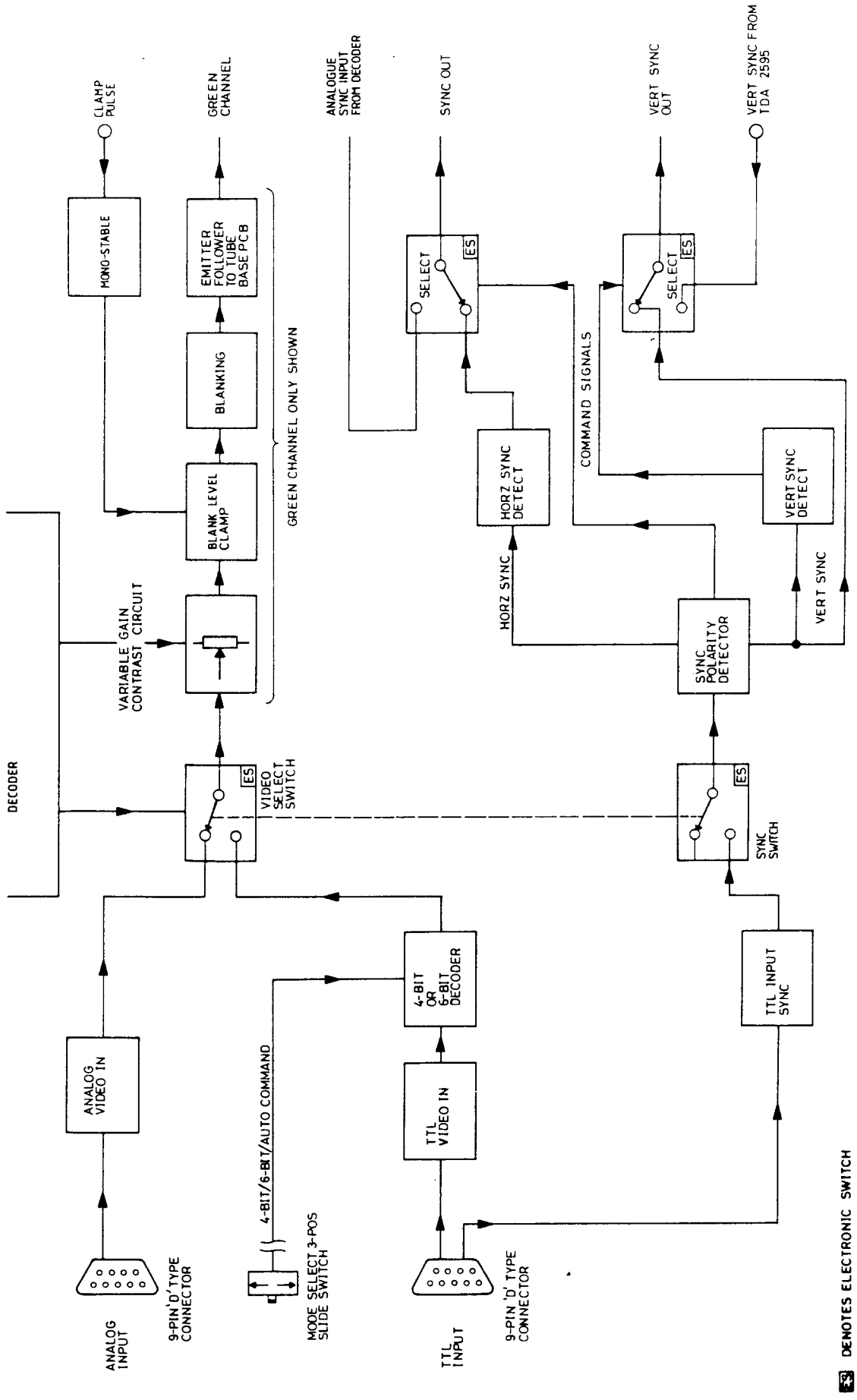


FIG. 1 INTERFACE PCB : VIDEO & SYNC ROUTEING

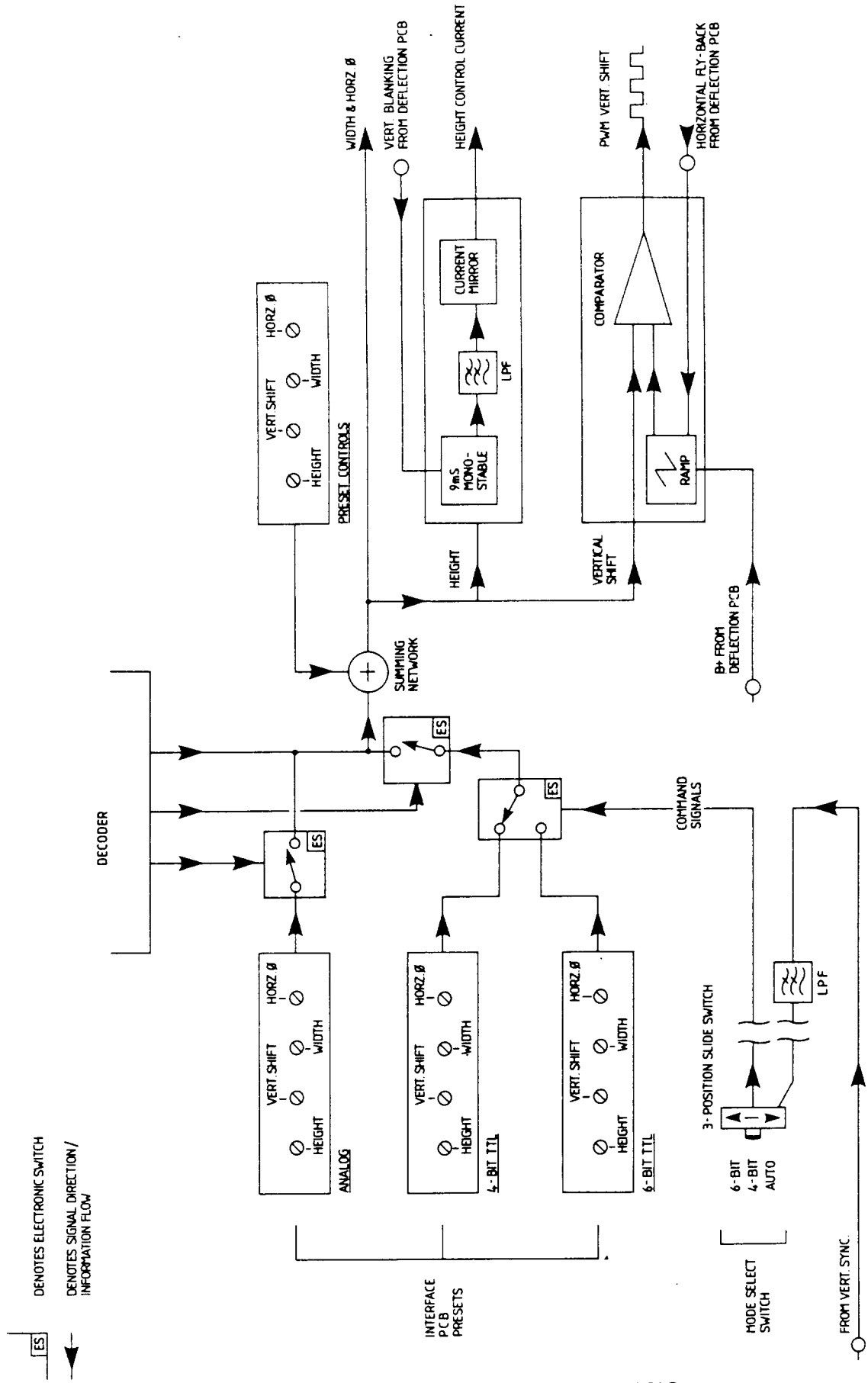


FIG. 2 INTERFACE PCB : PICTURE GEOMETRY CONTROLS

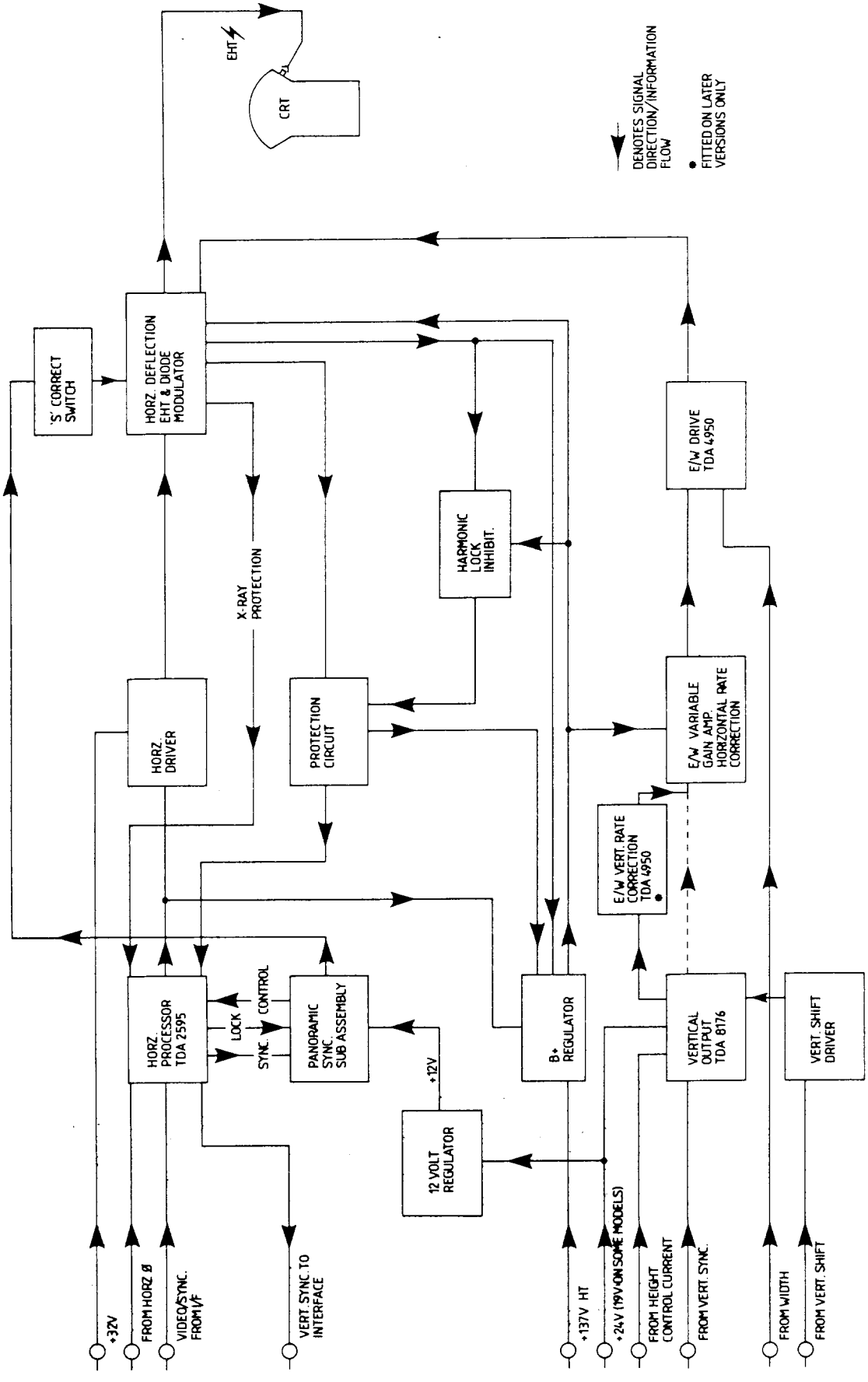


FIG. 3 DEFLECTION PCB : BLOCK DIAGRAM

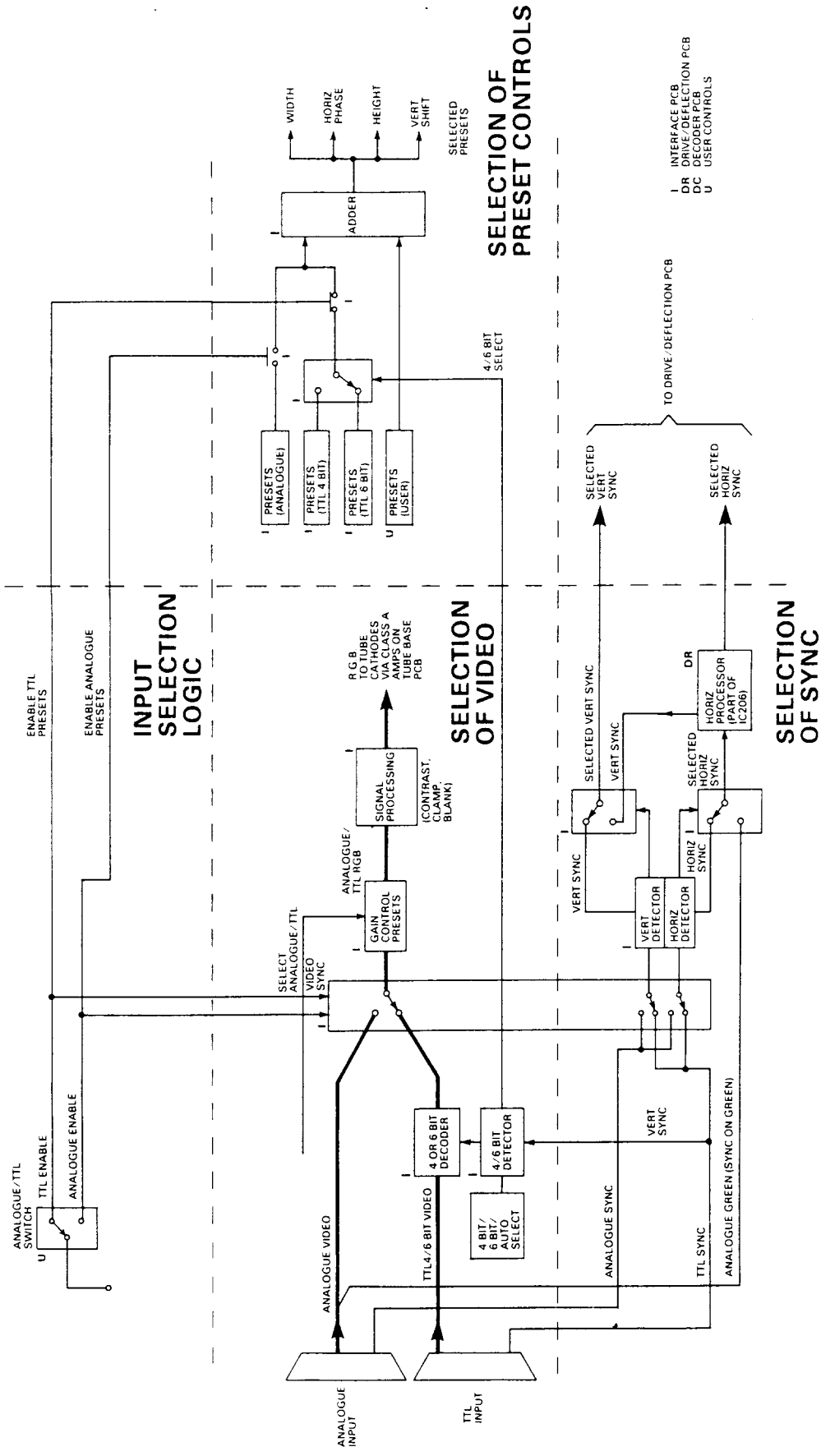


FIG. 4 BASIC MODEL : SIGNAL SELECTION DIAGRAM

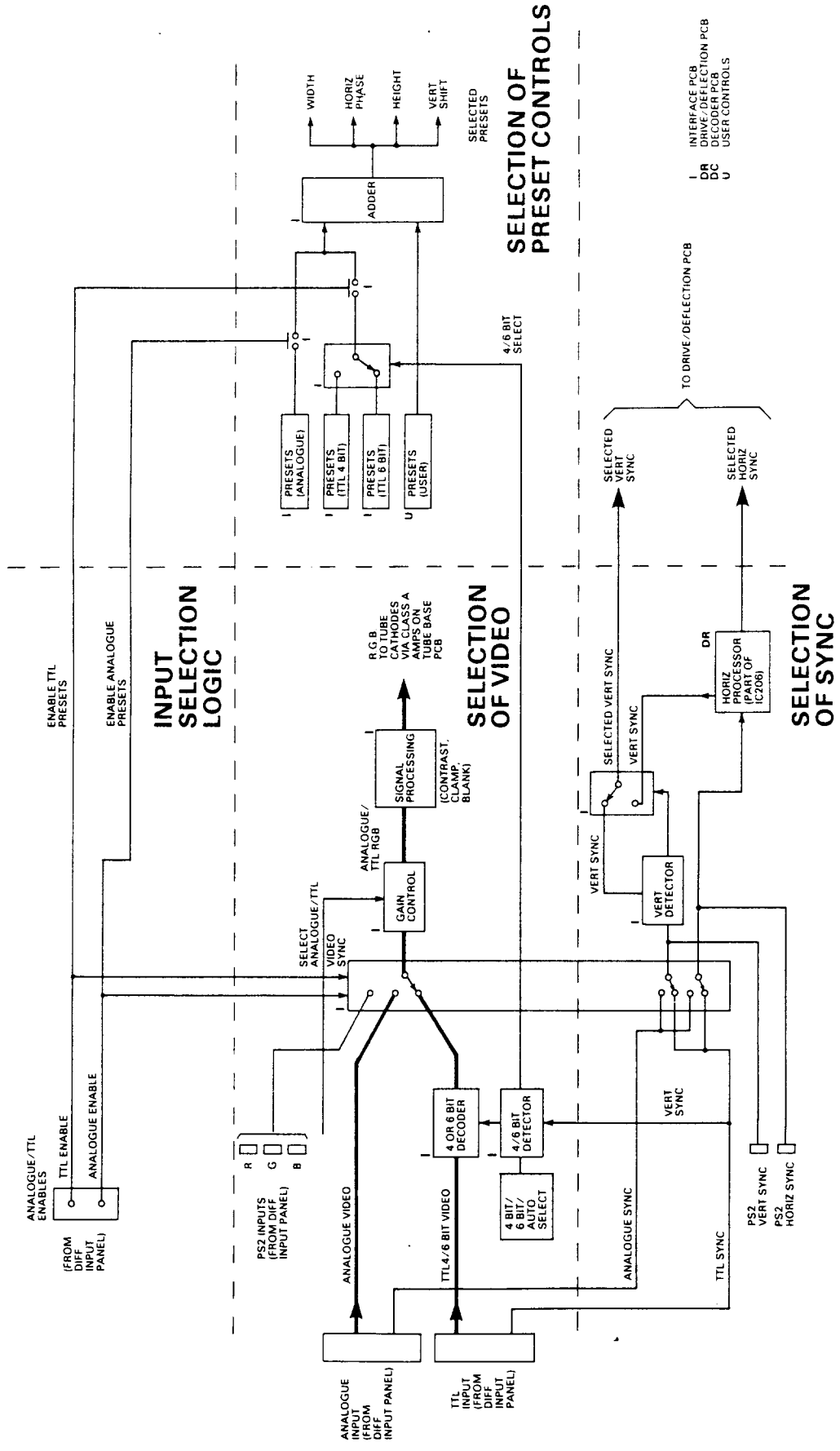


FIG. 5 DEALING ROOM MODEL : SIGNAL SELECTION DIAGRAM

SERIES 7 MK2: SWITCHED MODE POWER SUPPLY

GENERAL

This section gives the following information on the Switched Mode Power Supply for each Series 7 Mk 2 model.

Circuit diagram Waveform diagram

Layout diagram Components List

These are identified by Drawing Numbers.

Table 1 in the Introduction to this manual relates Model Numbers to these Drawing Numbers, so that the drawings appropriate to a particular model may be selected.

A circuit description is given for the first circuit diagram in this section. Where other circuits differ significantly, supplementary descriptions are given as necessary.

CIRCUIT DESCRIPTION, GENERAL (Circuit No. GO 1471)

The switched mode power supply is a fully isolated system and operates, under normal conditions, at a free running frequency of between 20kHz and 60kHz.

Integrated circuit IC1(TDA4601-D), provides control of all circuit functions within the power supply.

OUTPUT CIRCUIT

The rectified mains voltage developed across the reservoir capacitors C4, C5, C6 and C7, is switched to the primary winding of T2 by output transistor TR3. The output voltages provided are generated initially at taps on the secondary winding of T2.

These voltages are then rectified and smoothed to provide the various supply rails.

NOTE

The main DC HT supply rail is +137V. This covers all models.

IMPORTANT NOTE

With the link-socket SK3 installed in PL3 pins 1 and 2, or the Mains Select switch set to 110V, the unit is set for 110V AC mains input. Capacitors C4, C5, C6 and C7 then act as a voltage doubler.

BASE DRIVE TR1

The base drive for output transistor TR3 is generated within IC1.

A sawtooth voltage is developed at Pin 4, by R15, R16 and C11. This is used to generate a sawtooth base drive at Pin 8 to prevent over saturation of the output transistor TR3, and to limit the maximum excursions in TR3 collector current, thereby setting a power limit.

CONTROL/LOGIC CIRCUIT

A voltage, which is proportional to the output voltage, is taken from the feedback winding on T2, and is rectified and smoothed by D8 and C14. This voltage is attenuated by preset VR1 (Set HT), R11, R12 and R13 with respect to a reference voltage at Pin 1 of IC1, and is applied to Pin 3. Changes in the output are thus transmitted via Pin 3 to the control logic and base current amplifier within IC1.

In this way, the frequency and duty cycle of the output pulses are then adjusted to correct for any changes due to load and/or mains input voltage.

Preset VR1 (Set HT) adjusts the proportion of voltage feedback and hence the output at the Set HT measurement point.

Resistor R14 completes the oscillator feedback loop and feeds an attenuated voltage from T2 feedback winding to Pin 2 of IC1. This allows IC1 to detect the point at which the output pulse crosses zero voltage level, and thus provides correctly-timed base drive pulses to output transistor TR3.

The supply for IC1 is also provided by the winding on T2, Diode D6, and Capacitor C10. A start-up supply for IC1 is obtained through R5 and TR2. During start-up, TR2 is biased On by R4, thus providing a supply to Pin 9 which in turn initiates drive pulses to TR3 under the slow start control set by R12 and C13.

Once the supply rails have neared stabilisation, the voltage developed across C13 becomes sufficient to turn on the transistor TR1, which turns Off TR2. Power to IC1 is supplied via T2 only during normal operation.

OVERLOAD PROTECTION

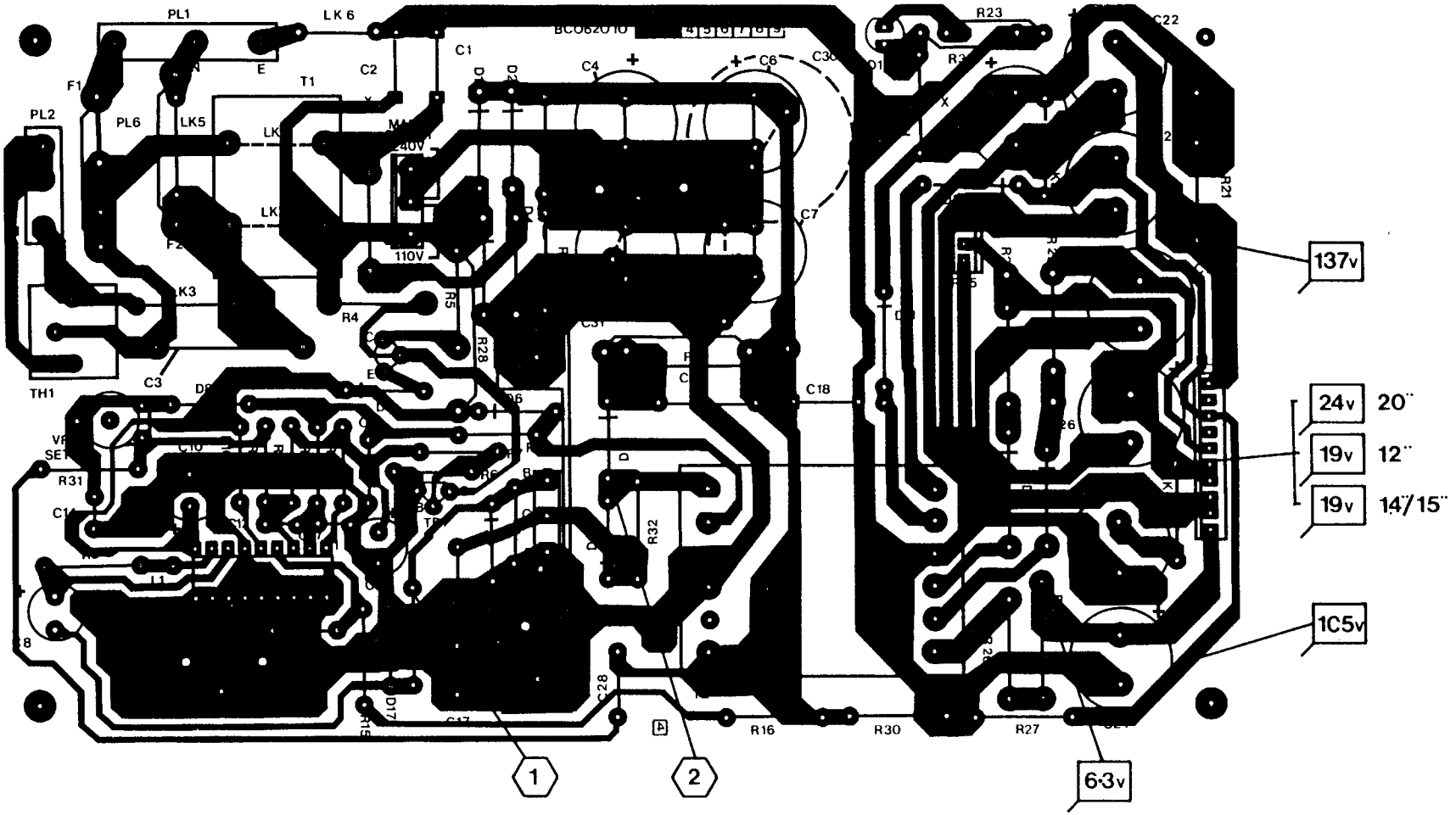
If an overload occurs on either the +137V or +105V outputs, the frequency and duty cycle are reduced.

If the load is increased further and becomes a short circuit, the frequency is further reduced to about 1.4kHz and consequently, the power output is limited to a low level.

The 19V or 24V, (depending on model) feed to the +12V regulator is protected by a fusible resistor R24. The +12V rail is further protected by the Thermal Shutdown mechanism of the regulators IC203 and IC517.

The +32V feed is protected by a fusible resistor R25.

Normal operation of the unit is indicated by the illumination of an LED (D13). This indication is particularly useful if the monitor is being operated without signals applied to the input. Under these conditions, the main HT voltage increases to about + 155V, and the video HT to + 118V. All other supplies remain substantially constant.



SWITCHED-MODE POWER SUPPLY PCB LAYOUT DIAGRAM

Notes
1. Track (Bottom Side) is shown 'viewed through the board.'
2. Symbol ⬡ denotes waveform measurement point.
3. Symbol ▭ denotes voltage measurement point.
4. Waveform — Refer to: Drive/Deflection PCB Assembly Circuit Diagram. Drg. No. GO1150, sheet 2 of 2.
   Voltage — Refer to: Switched Mode Power Supply PCB Circuit Diagram. Drg. No. GO1152.

SERIES 7 MK2: SWITCHED MODE POWER SUPPLY PCB: COMPONENTS LIST

COMPONENTS LIST

A Components List is given for one PCB, under its Assembly number. A list of differences is given for each variant of that PCB, under its own Assembly number.

The appropriate Assembly number for a PCB in a particular model may be found

SERIES 7 MK2: SWITCHED MODE POWER SUPPLY PCB: COMPONENTS LIST

RESISTORS

Circuit Reference	Component Reference	Component Description
R18	RF102 DJO	100R 1/4W 5% CF
R20	RW154 RK5	15K 5W 10% WW
R21	RO470 LJO	4R7 2W 5% MO
R22,23	RF124 GJO	12K 1/2W 5% CF
R24	RW033 PK5	OR33 4W 10% WW
R25	RO100 JJO	1R0 1W 5% MO
R26)		
R28)	Not fitted (see note on Circuit GO1471)	
R27	RF394 GJO	39K 1/2W 5% CF
R30	RG336 GJO	3M3 1/2W 5% MO
R31	RF226 DJO	2M2 1/4W 5% CF
R32	WL6300 TUI	OR (Link)

CAPACITORS

C1,2,18	CY103 NL6	1000p 250V 10% C
C3	CX475 NK7	470n 250V
C4-7	CA108 NL7	100u 250V AE
C8,10,13	CA108 FL7H	100u 25V 20% AE
C11,15)	CM104 TJ6	10n 630V 5% MP
C28)		
C12	CD102 KK6	100p 100V 10% C
C14	CM475 8K6	470n 63V MP
C16	CM105 RK6	100n 400V 10% MP
C17	CL103 YJ6	1000p 2000V 5% PP
C20,21,22	CA477 NL7H	47u 250V 20% AE
C23	CA229 IL7H	2200u 40V 20% AE
C24,26	CA229 FL7	2200u 25V 20% AE
C25	CN229 FN7	2200u 25V LEE
C27	CC223 KK6	2n2 100V C

SERIES 7 MK2: SWITCHED MODE POWER SUPPLY PCB: COMPONENTS LIST

DIODES

Circuit Reference	Component Reference	Component Description
D1-4	DP4007 UUO	1N4007
D5,8	DS4148 UTO	1N4148
D6)		
D7,15)	DF0157 UUO	BA157
D10	DF0159 UEO	BA159
D11,12	DF0096 UPO	MR818
D13	VN0004 RUO	Red Led IMO Ref: 5141RD
D14,16	DF0852 UMO	MR852

TRANSISTORS

TR1	QS0337 UTO	BC337-RL1
TR2	QS0042 UUO	MPA42
TR3	QQ0423 USO	IF423 Isowatt TO218

INTEGRATED CIRCUIT

IC1	IW4601 UV2	TDA4601D

THERMISTOR

TH1	RT005 QNO	263100P232T333

POTENTIOMETER

VR1	RQ103 AL2	1K0 0.1W

FUSE

F1	KA2001 BAU	5x20mm T2A A/S

TRANSFORMERS

T1		
T2	TO0941 I03	SMPS Isolation Transformer

SERIES 7 MK2: SWITCHED MODE POWER SUPPLY PCB: COMPONENTS LIST

INDUCTORS

Circuit Reference	Component Reference	Component Description
L1	LU0001 MK1	Ferrite Bead FX1115
L2	LW153SK1	1u5 B78108-S1152-K

SERIES 7 MK2: SWITCHED MODE POWER SUPPLY PCB: COMPONENTS LIST

SWITCHED MODE POWER SUPPLY PCB AO4012 & AO4071.

The Components List is as for AO3638 AND AO3857, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R26	WL2215 TU1	Wire Link
R32	WL6300 TU1	Wire Link

DIODES

D6	D1103 ECO	Schottley 1A 30V

THERMISTORS

TH1	RT002 QLO	PTH45LCO9-BG8ROH140

SERIES 7 MK2: SWITCHED MODE POWER SUPPLY PCB: COMPONENTS LIST

SWITCHED MODE POWER SUPPLY PCB AO4195 & AO4194.

The Components List is as for AO3638 and AO3857, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R26	WL2215 TU1	Wire Link

THERMISTORS

R32	WL6300 TU1	Wire Link
TH1	RT001 NQ1	120/240V P.T.C.

SERIES 7 MK2: SWITCHED MODE POWER SUPPLY PCB: COMPONENTS LIST

SWITCHED MODE POWER SUPPLY PCB AO3979 & AO3762.

The Components List is as for AO3678 and AO3857, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R11(in	RM223 DIO	2K2 1/4W 2% MF
Parallel)	RF474 DJO	47K 1/4W 5% CF
R14	WL2218 TUI	Wire Link
R16	RM105 GIO	100K 1/2W 2% MF
R24	Not fitted	
R26	WL2215 TUI	Wire Link

CAPACITORS

C3	CX225 NL6	220n 250V MP

THERMISTORS

TH1	RT001 Q81	120/140V PTC

SERIES 7 MK2: SWITCHED MODE POWER SUPPLY PCB: COMPONENTS LIST

SWITCHED MODE POWER SUPPLY PCB AO3181 & AO3734.

The Components List is as for AO3638 and AO3857, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R11(in	RM223 DIO	2K2 1/4W 2% MF
parallel)	RM474 DJO	47K 1/4W 5% CF
R16	RM105 GIO	100K 1/2W 2% MF
R22,23	RF184 DJO	18K 1/4W 5% CF
R26	WL2215 TUI	Wire Link
R27	RF105 DJO	100K 1/4W 5% CF

CAPACITORS

C3	CX225 NL6	220n 250V MP
C28	Not fitted	
C29	CK223 JKO	2n2 50V 10% CT

THERMISTORS

TH1	RT001 Q81	120/240V PTC

FUSES

F1	Not fitted	

TRANSFORMERS

T2	TO1099 I02	SMPS Transformer E42/20

INDUCTORS

L3	LO1289	Filter Choke PC6522

SERIES 7 MK2: SWITCHED MODE POWER SUPPLY PCB: COMPONENTS LIST

SWITCHED MODE POWER SUPPLY PCB AO4206, AO4233.

The Components List is as for AO3638 and AO3857, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R16	RM105GIO	100K 1/2W 2% MF

DIODES

D6	DC1103EUO	SCHOTTKY 1A 30V

SERIES 7 MK2: MANUAL DEGAUSS PCB

GENERAL

This section gives the following information on the Manual Degauss PCB for each Series 7 Mk 2 model that uses it.

Circuit diagram Layout diagram Components List

These are identified by Drawing Numbers.

Table 1 in the Introduction relates Model Numbers to these Drawing Numbers, so that the drawings appropriate to a particular model may be selected.

A circuit description is given for the first circuit diagram in this section. Where other circuits differ significantly, supplementary descriptions are given as necessary.

On some models in the Series 7 range of monitors, provision is made for a Manual Degauss operation of the picture tube in addition to the automatic Degauss at Switch-On normally incorporated.

This Manual Degauss facility is denoted by the provision of a DEGAUSS Pushbutton on the customer user control panel. This additional facility is provided for by the inclusion of the Automatic/Manual Degauss PCB in the modular assembly of the monitor.

MAINS INPUT SELECTION

Only models equipped with this PCB have provison made for selection of mains input supplies to the monitor of either 110V AC 50/60Hz or 240V AC 50/60Hz.

IMPORTANT NOTE

Normally, these settings are made at the time of manufacture and must be the same as those on the Switched Mode Power Supply. Any subsequent changes to settings must be made on both this PCB and the Switched Mode Power Supply PCB. Mains Input selection for the Automatic/Manual Degauss PCB is made by the positioning of a Selector Link on PL853 or PL854.

Settings for the Selector Link are as follows:

240V 50/60Hz Link on PL854 only

110V 50/60Hz Link on PL853 only

AUTOMATIC/MANUAL DEGAUSS: CIRCUIT FUNCTION

The circuit automatically degausses the monitor when the power is first switched on. A Pushbutton switch on the customer control panel allows independent manual degaussing as required.

The circuit is energised from the mains and utilises positive temperature coefficient thermistors (PTC/s). A Triac (TR851) is used to switch the mains voltage across the series combination of thermistors, (TH850 and TH851) and the Degauss Coil. The resistance of the thermistors increases as they heat up, due to the flow of degaussing current. This causes the degaussing current to decay in a manner that provides demagnetization of the picture tube ferrous metal electrode structure.

AUTOMATIC DEGAUSS

When power is first Switched On, Electrolytic Capacitor C750 charges up through power resistors R850 and R851. When the capacitor voltage reaches 12V, Zener diode D853 conducts.

This conduction in turn supplies base current to transistor TR850, turning the transistor on and thus grounding the negative end of capacitor C852. This capacitor then begins to charge, consequently applying a negative pulse to Pin 2 of IC850, causing it to trigger.

As IC850 is configured as a monostable, this produces a positive pulse, whose duration is determined by components R858 and C857. This positive pulse is then applied to the gate of the Triac TR851.

This pulse switches the Triac On and as a result, applies an AC degaussing current, via connector PL851 to the CRT Degaussing Coil.

MANUAL DEGAUSS

Manual Degauss is initiated by a Pushbutton switch on the customer control panel. This switch is isolated from the remainder of the PCB circuit by the opto-coupled Isolator IC851.

When the manual Degauss Pushbutton switch is first pressed, the isolated 12V supply (fed via connector PL852) is applied to Pin 1 of IC851, via resistor R861.

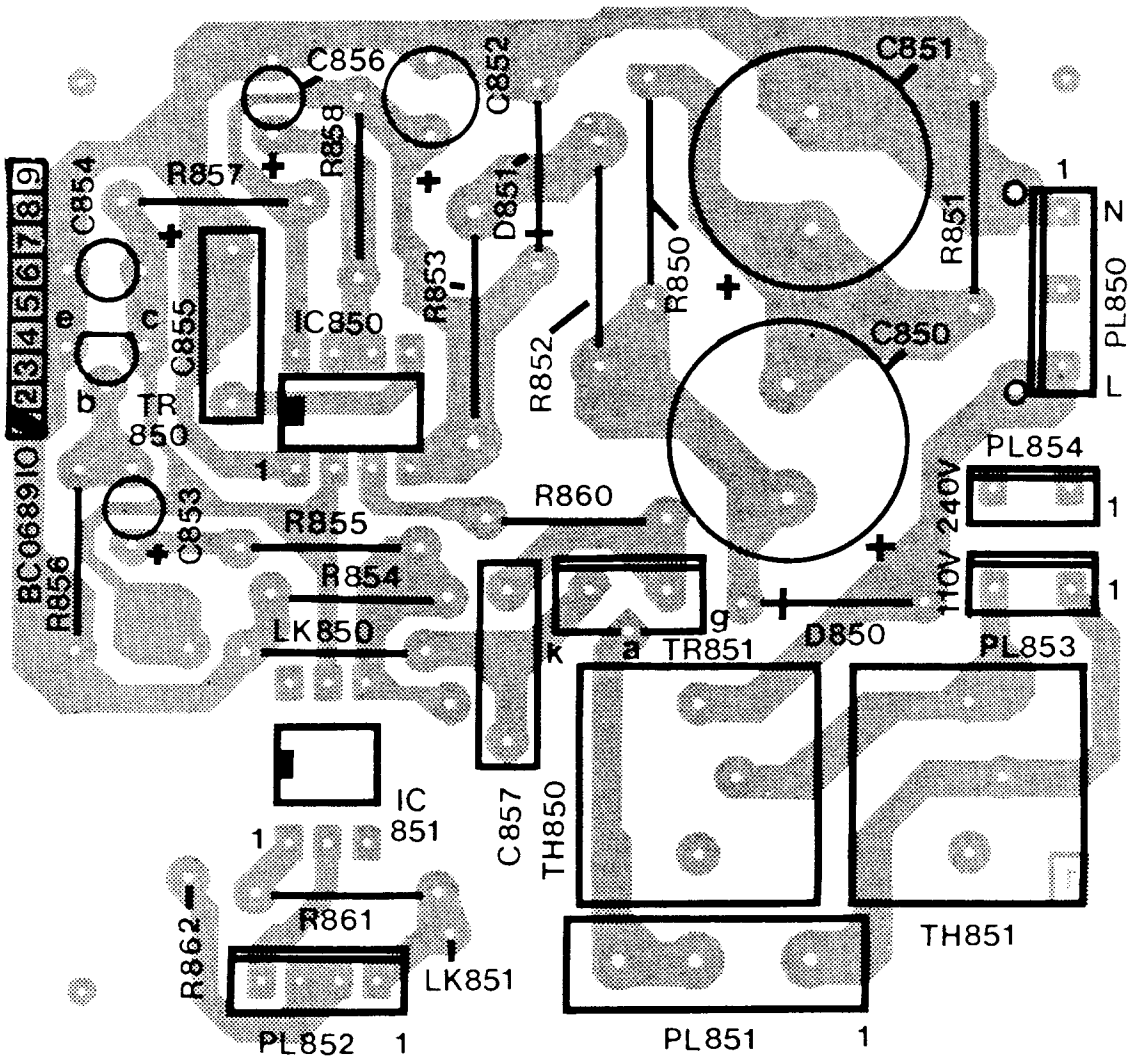
This turns on a transistor device within the IC itself and connects Pin 2 of this timer IC, to the positive end of electrolytic capacitor C853.

The capacitor then charges up, and, as in the Automatic Degauss Cycle, applies a negative going pulse to Pin 2 of IC850.

This once again triggers the monostable, causing a Degaussing Cycle to commence. The sequence is repeated each time the Degauss Pushbutton is Pressed.

IMPORTANT NOTE

The Pushbutton Degauss switch may be operated at any time, but note that the Degauss current available will **not** be at its maximum until thermistors TH850 and TH851 have been allowed to cool sufficiently between successive operations of either manual or automatic degaussing.



MANUAL DEGAUSS PCB LAYOUT

SERIES 7 MK2: MANUAL DEGAUSS PCB: COMPONENTS LIST

COMPONENTS LIST

A Components List is given for one PCB, under its Assembly number. A list of differences is given for each variant of that PCB, under its own Assembly number.

The appropriate Assembly number for a PCB in a particular model may be found by reference to Table 1 in the Introduction to this Manual.

In the Components Lists, the following abbreviations are used.

RESISTORS	CAPACITORS
CC Carbon Composition	AE Aluminium Electrolytic
CF Carbon Film	C Ceramic
MF Metallised Fim	CT Ceramic Tube
MO Metal Oxide	MP Metallised Polymer
TH Thermistor	PC Poly Carbonate
WW Wire Wound	PS Polystyrene
	T Tantalum

PTC Positive Temperature Coefficient.

MANUAL DEGAUSS PCB AO3085.

RESISTORS

Circuit Reference	Component Reference	Component Description
R850, 851	RW223TJO	2K2 6W 5% WW
R852	RF333DJO	3K3 1/4W 5% CF
R853	RF106DJO	1M0 1/4W 5% CF
R854	RF103DJO	1K0 1/4W 5% CF
R855, 856	RF224DJO	22K 1/4W 5% CF
R857	RF104DJO	10K 1/4W 5% CF
R858	RF334DJO	33K 1/4W 5% CF
R859	RF272DJO	270R 1/4W 5% CF
R860	RF102DJO	100R 1/4W 5% CF
R861	RF123DJO	1K3 1/4W 5% CF

CAPACITORS

C850	CA109HL9	1000u 35V 20% AE
C851	CA108FL7H	100u 25V 20% AE
C852	CA4768L7	4u7 63V 20%

SERIES 7 MK2: MANUAL DEGAUSS PCB: COMPONENTS LIST

CAPACITORS

Circuit Reference	Component Reference	Component Description
C853	CA337FL7	33u 25V 20% AE
C854,856	CM105NK6	100n 250V 10% MP
C855	CA227FM7	22u 25V AE
C857	CA107JL7	10u 50V 20% AE
C858	CD104YP7	10n 2KV -20% + 80% C

DIODES

D850	DP4007UU0	IN4007
D851, 852	DZ88750FBO	ZENER BZY88B7V5 2%
D853	DZ79121FBO	ZENER BZX79B12V 2%
D854	DZ79111FBO	ZENER BZX79B11V 2%

INTEGRATED CIRCUITS

IC850	IC7555UU2	ICM7555IPA
IC851	JJ0614UU6	IS614-N-B

TRANSISTORS

TR850	QS0337UUO	BC337-RL1
TR851	QK4600TTO	BTB04600T

THERMISTORS

TH850, 851	RT002QLO	PTH45LC09-BG8ROH140

SERIES 7 MK2: PANORAMIC SYNC PCB

GENERAL

This section gives the following information on the Panoramic Sync PCB for each Series 7 Mk 2 model.

Layout diagram Components List

These are identified by Drawing Numbers.

Table 1 in the Introduction to this manual relates Model Numbers to these Drawing Numbers, so that the drawings appropriate to a particular model may be selected.

The circuit is included in the circuit diagram for the Drive/Deflection PCB, given in an earlier section. The circuit description is for the first circuit diagram in that section. If other circuits differ significantly, supplementary descriptions are given as necessary.

CIRCUIT DESCRIPTION

This circuit works in conjuction with the Horizontal Processor, IC206 (Type TDA2595). Its purpose is to sweep the horizontal oscillator through the range of horizontal frequencies and lock the loop on to the incoming horizontal synchronising pulses. The design is centred around an up/down counter, used to simulate a DC voltage. This voltage relates to a specific line frequency. Other functions provided by the circuit are:

1. High/Low Frequency Line, provided to switch in S-correction capacitors.

2. A B + Regulator Inhibit Line

3. VCO phase-locked-loop filtering circuit.

DC VOLTAGE SIMULATION

The oscillator in IC206 (Type TDA2595) is controlled by the current taken from the constant voltage source on Pin 14. The current can be modified by sinking-or- sourcing current from this point and hence the oscillator frequency can also be controlled. When the monitor is out-of-lock, the \B + Inhibit line (Pin 7 of IC206) is low. This forces IC104 to count up-then- down repetitively. This sweeping waveform at the output of IC104 is applied to the oscillator reference via amplifier IC101c and a weighting resistor R128.

At the same time, horizontal sync take-off from IC206 pin 10 is developed across resistor R300 and applied to the differential amplifier IC209. This provides common mode rejection of interference. The sync is then applied to monostable IC103, whose output is integrated to form a DC voltage. This DC voltage is fed to comparator IC101d, which provides a switch at 25kHz +/-0.5kHz. The frequency is determined by the 1% resistors R106, R108 which determine the level into IC101d. By applying feedback around the comparator, a window is created which prevents spurious switching due to noise. The output of the comparator is low for 23.5kHz to 38.5kHz and high for 13.5kHz to 27kHz.

This output is used to switch the S-correction capacitors (C265/C266) and also to control the range of oscillator frequencies, via R127, R128 and R153.

Capacitors C112, C115 slew the comparator and op-amp outputs of IC101c and IC101d during frequency change, thereby preventing voltage overshoots on the horizontal deflection transistor.

At some time during the sweep, IC206 (TDA2595) will lock to the incoming sync signal. At this time, the \B+ Inhibit line (Pin7) is released, and is pulled high. The sweep condition is terminated. The counter then becomes controlled by the relative levels on the phase line and the oscillator reference line. Having achieved lock, the counter then slow-counts, until a preset phase error is reached. IC102 provides the control of the counter by comparing the phase and oscillator reference lines, and then toggling the up- or-down lines as required.

Having achieved the best simulated voltage, the clock is disabled by turning on TR104, and a long time constant filter is activated by turning on TR106. Further compensation is provided by the network C106, R142 and IC101a, which filters out any unwanted phase errors.

As the \B+ inhibit line goes **high** it allows the B+ supply to become established and in turn activates the EHT supply. Also D102, a Light Emitting Diode, illuminates to indicate that the monitor has locked.

The circuit is based upon an Up/Down, Digital-to- Analogue Convertor, Type ZNA435(IC104). Its clock frequency is determined by RC components C109 and R132. In the unsynchronised state, the \B+ Inhibit line is low so that Pins 9 and 11 of IC102 (LM339) are low, and Pin 8 of IC102C and Pin 10 of IC102d are connected to the 2.5V reference pins on IC104. So, for this condition, the comparator outputs on Pins 13 and 14 of IC102 are forced low.

Because of the open collector configuration of the comparators, IC102A and IC102B outputs can have no influence on the up/down control lines of IC104. Consequently, the output at Pin 11 of IC104 produces a continuous triangular waveform with a period in the region of one second. The amplitude is 2.5V, starting from OV and going positive. The resulting output is amplified to about 8V by the operational amplifier IC101C, and then level shifted to be symmetrical at approximately 6V. The gain of IC101c is switched to control the upper band downward sweep to 23.5kHz to ensure an overlap between the two bands.

Gain switching is by D105 which switches R152 into circuit at C101c pin 2 at the lower end of the sweep.

This triangular sweep voltage is applied to Pin 14 of IC206 (TDA2595), via R128. Pin 14 of IC206 is at approximately 6V, this being available as a reference voltage in the IC. Resistor R308 is the timing resistor for IC206 which, in conjuction with C248, sets the free-run frequency. When the voltage is lower, then current is taken from Pin 14, via R128 , in addition to that taken by R308.

The charge and discharge current of C248 increases proportionally, causing the increase in the oscillator frequency. Conversely, a lowering of frequency is effected when the output of IC101C is high, because the current being taken from Pin 14 is reduced.

Synchronising pulses are extracted from IC206 by the pulse amplifier IC209. Transistor TR103 drives these sync pulses into IC103(NE555), a monostable timer circuit. Timing is determined by R141 and C102. The output of the timer is a square-wave whose mark-space ratio is determined by the frequency of the sync pulses. The timer's output is filtered by R105 and C104, the resultant DC voltage being proportional to the sync frequency.

IC101D acts as a comparator with a degree of hysteresis, such that its output is high for sync frequencies below 26kHz, and low for frequencies above 26kHz. Resistor R127 thus switches the range of frequencies controlled by IC206 (TDA2595) into an upper and lower band. This is done in order to inhibit Harmonic Lock conditions, which can otherwise occur.

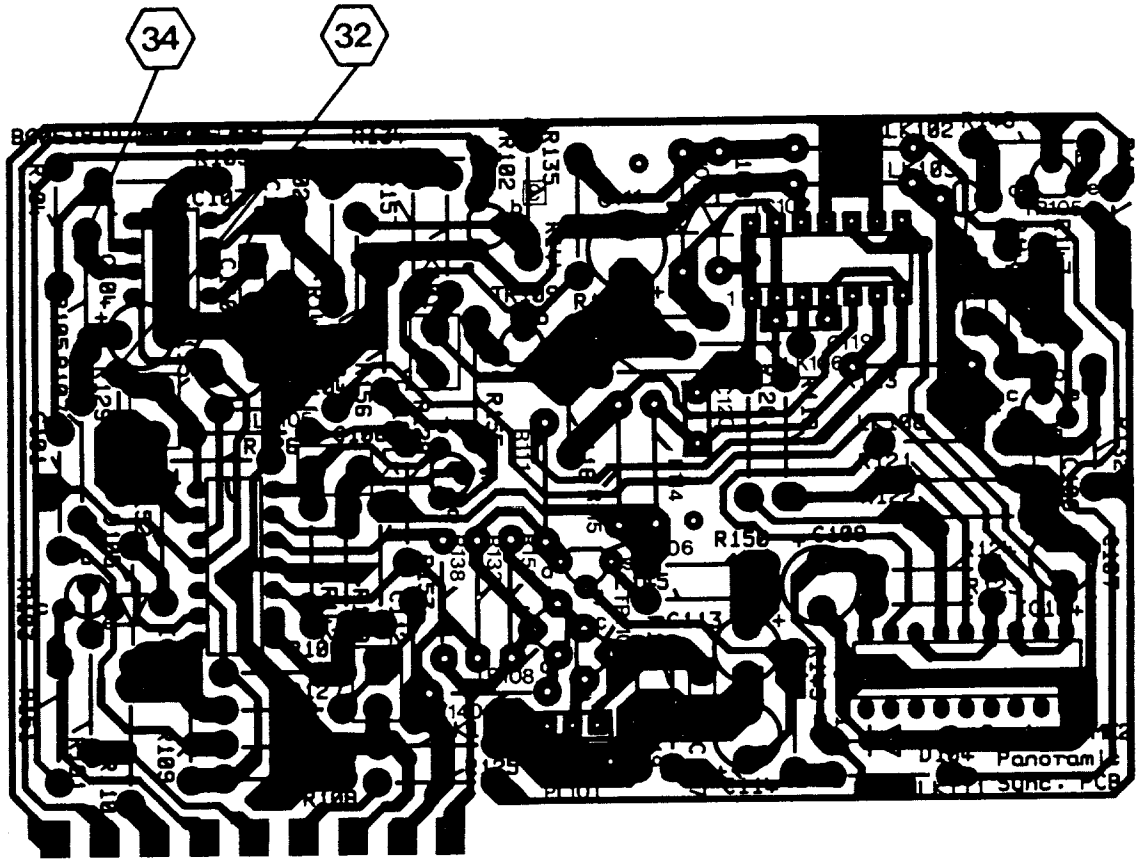
When the coincidence detector within IC206 generates a Lock-Signal, indicating that the VCO (Voltage Controlled Oscillator) is within the lock range of the sync input, then its output on Pin 7 goes high. In response, the outputs of the two comparators IC102c/d are turned Off, releasing control of the up/down lines to the phase-detector output voltage on Pin 17 of IC206, and comparing it to the reference voltage in the VCO of IC206.

The circuit is arranged to drive the output of IC104, such that the phase-detector error is reduced to a low level, indicating that the VCO is almost perfectly adjusted. A dead band, created for stability reasons as a window at the comparator inputs, causes both up and down lines to remain high, thus inhibiting the IC104 count. The reference voltage for IC206 is buffered by the high-input-impedance voltage follower IC101B to avoid loading effects by the Panoramic Sync Sub Panel.

The integrator, IC101a, is employed to eliminate any residual error between the phase detector output and the reference voltage. This is done to provide consistent picture phase (position on the screen).

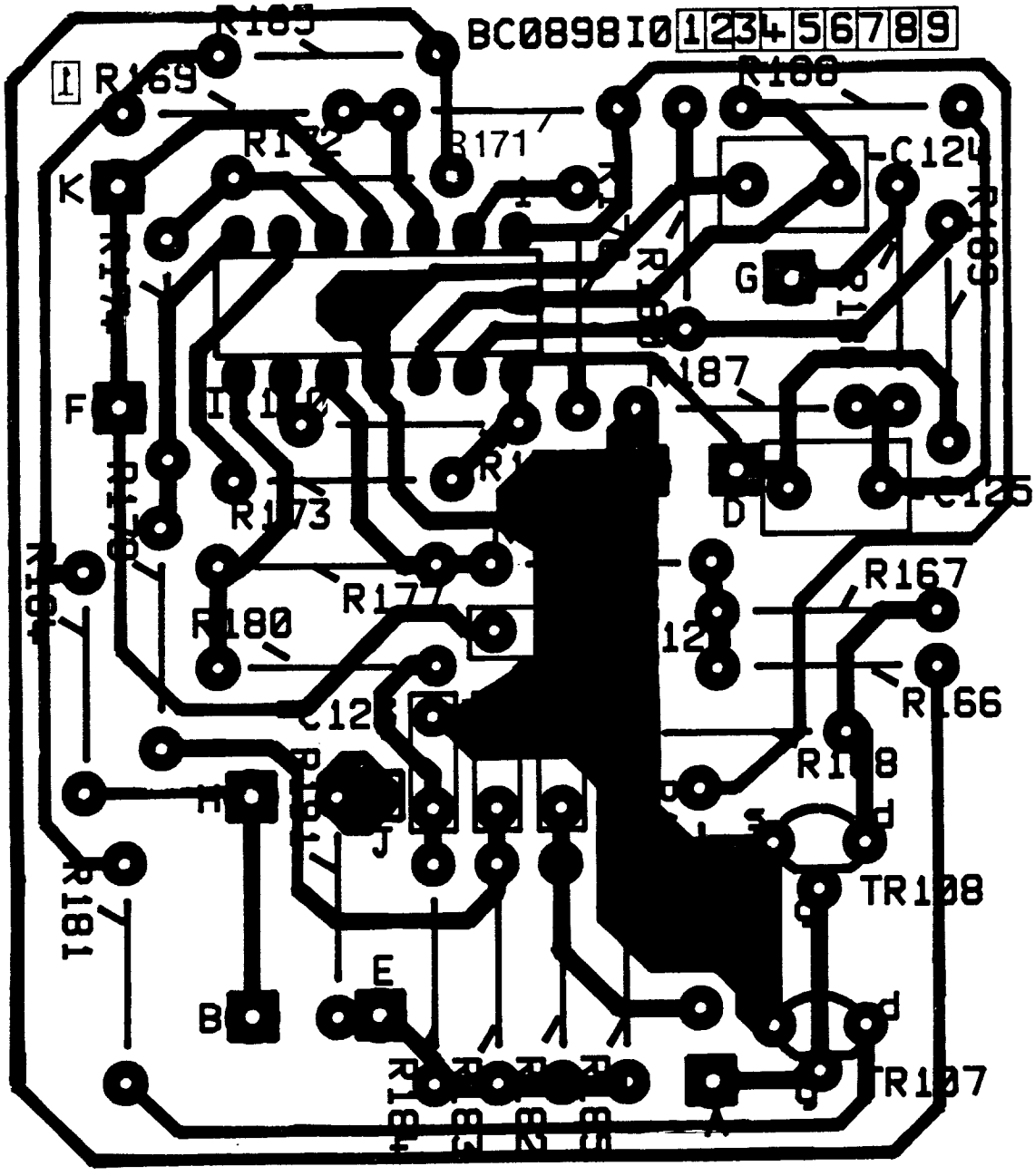
After the up/down counter has settled, and both up- down lines are established high, C114 is allowed to charge to 12V. This turns the Mosfet transistor TR106 On.

Components R145 and C113 form the long time constant filter, which is switched to the phase detector output after synchronisation has occurred. Capacitor C113 is charged by R150, prior to synchronisation, to the same voltage as the reference voltage of IC206. This equates to the phase-detector output voltage, when optimally locked. Therefore, no disturbance occurs when the Mosfet transistor connects the capacitor C113 to the phase detector output. TR104 is also turned on at this stage, and ensures that no D/A count can occur, due to noise or other transient effect.



Notes
1 Track (Bottom Side) is shown 'viewed through the board.'
2 Symbol ⬡ denotes waveform measurement point with reference to: Drive/Deflection PCB Assembly Circuit Diagram

PANORAMIC SYNC PCB LAYOUT
ALL MODELS EXCEPT 12L71DNS3



PANORAMIC SYNC PCB LAYOUT
12L71DNS3 MODELS

SERIES 7 MK2: PANORAMIC SYNC PCB: COMPONENTS LIST

COMPONENTS LIST

A Component List is given for one PCB, under its Assembly number. A list of differences is given for each variant of that PCB, under its own Assembly number.

The appropriate Assembly number for a PCB in a particular model may be found by reference to Table 1 in the Introduction to this Manual.

In the Components Lists, the following abbreviations are used.

RESISTORS	CAPACITORS
CC Carbon Composition	AE Aluminium Electrolytic
CF Carbon Film	C Ceramic
MF Metallised Film	CT Ceramic Tube
MO Metal Oxide	MP Metallised Polymer
TH Thermistor	PC Poly Carbonate
WW Wire Wound	PS Polystyrene
	T Tantalum

PTC Positive Temperature Coefficient.

PANORAMIC SYNC PCB AO3638.

RESISTORS

Circuit Reference	Component Reference	Component Description
R101,102,104,110,111, 114,115,123	RF103 DJO	1K0 1/4W 5% CF
R103	RF562 DJO	560R 1/4W 5% CF
R105	RF183 DJO	1K8 1/4W 5% CF
R106	RM183 DHO	1K8 1/4W 1% MF
R107,121,122,135,138, 139,143,148,150	RF104 DJO	10K 1/4W 5% CF
R108	RM393 DHO	3K92 1/4W 1% MF
R109	RF125 DJO	120K 1/4W 5% CF
R112	Not fitted	
R113,116	RF334 DJO	33K 1/4W 5% CF
R117,118,144,154	RF223 DJO	2K2 1/4W 5% CF
R119,120	RF224 DJO	22K 1/4W 5% CF
R124	RF392 DJO	390R 1/4W 5% CF
R125	RL101 GJO	10R 1/2W 5% MF

SERIES 7 MK2: PANORAMIC SYNC PCB: COMPONENTS LIST

RESISTORS

Circuit Reference	Component Reference	Component Description
R126	RM223 DHO	2K21 1/4W 1% MF
R127	RM913 DHO	9K1 1/4W 1% MF
R128	RM284 DHO	28K 1/4W 1% MF
R129,152	RM563 DHO	5K62 1/4W 1% MF
R132	RF683 DJO	6K8 1/4W 5% CF
R134	RF123 DJO	1K2 1/4W 5% CF
R136,147	RF473 DJO	4K7 1/4W 5% CF
R140	RF684 DJO	68K 1/4W 5% CF
R141	RM413 DHO	4K12 1/4W 1% MF
R145	RF153 DJO	1K5 1/4W 5% CF
R146	RF332 DJO	330R 1/4W 5% CF
R149	RF105 DJO	100K 1/4W 5% CF
R151	WL6300 TUI	Wire Link
R153	RM274 DHO	27K 1/4W 1% MF
R153	RF395 DJO	390K 1/4W 5% CF
R156	RF475 DJO	470K 1/4W 5% CF
R157	RF222 DJO	220R 1/4W 5% CF
R158	RF275 DJO	270K 1/4W 5% CF
R159	RF825 DJO	820K 1/4W 5% CF

CAPACITORS

C101	CK223 JKO	2n2 50V 10% CT
C102	CP333 MHO	3n3 160V 1% P
C103,109	CM105 8K6	100n 63V 10% MB
C104	CA227 FM7	22u 25V AE
C106,112,115,116	CM475 8K6	470n 63V MP
C107,113	CA476 JL7	4u7 50V 20% AE
C108,110,111	CA108 FM7	100u 25V AE
C114	CA107 JL7	10u 50V 20% AE
C117	CM224 8K6	22n 63V 10% MP
C118	CD104 8K6	10n 63V 10% CD
C119,120	CK121 JKO	12p 50V CT

SERIES 7 MK2: PANORAMIC SYNC PCB: COMPONENTS LIST

DIODES

Circuit Reference	Component Reference	Component Description
D100,101,105	DS4148 UTO	1N4148
D102	VN0004 RUO	Red LED IMO 514 1RD

TRANSISTORS

TR102,104,105,110	QS0337 UUO	BC337-RLI
TR103	QS4123 UUO	2N4123
TR106	QE7000 UUO	2N7000 FET
TR107,108	QF0112 UK1	J1112 N Channel FET
TR109	QS0307 UU5	BC 307-5

INTEGRATED CIRCUITS

IC101	IL0324 NU2	LM324N Quad Op Amp
IC102	IL0339 UU2	LM339
IC103	IL0555 PU2	NE555P Timer
IC104	IL0435 UF2	ZN435

PANORAMIC SYNC PCB AO4012.

The Components List is as for AO3638, with the following exceptions.

DIODES

Circuit Reference	Component Reference	Component Description
D104	DZ79510 FBO	Zener BZX79B5V1 2%

SERIES 7 MK2: PANORAMIC SYNC PCB: COMPONENTS LIST

PANORAMIC SYNC PCB AO4195.

The Components List is as for AO3638, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R105	Not fitted	
R108	RM473 DHO	47K 1/4W 1% MF
R109	RF105 DJO	100K 1/4W 5% CF
R127	RM1273 DHO	12K7 1/4W 1% F
R128	RM684 DHO	68K 1/4W 1% MF
R132	RF124 DJO	12K 1/4W 5% CF

CAPACITORS

C109	CM224 8K6	100n 63V 10% MP
C110,111	CA108 EL2	100u 16V AE
D104	DZ79510 FBO	Zener BZX79B5V1 2%

An additional board, Multiband PCB, is fitted to this Panoramic Sync PCB. Its Components are listed:

Multiband PCB

RESISTORS

R164	RM222 DHO	220R 1/4W 1% MF
R165,166	RM472 DHO	470R 1/4W 1% MF
R167	RM273 DHO	2K7 1/4W 1% MF
R168	RM183 DHO	1K8 1/4W 1% MF
R169,172,175	RF183 DJO	1K8 1/4W 5% CF
R70,173,176	RF104 DJO	10K 1/4W 5% CF
R171,174,177,182-184	RM155 DHO	150K 1/4W 5% MF
R178-180	RM124 DHO	12K 1/4W 1% MF
R181	RM4421 DHO	442R 1/4W 1% MF
R185	RF225 DJO	220K 1/4W 5% CF
R186	RJ504 IK8	50K Multi-turn pot
R187	RM514 DHO	51K 1/4W 1% MF
R188	RM334 DHO	33K 1/4W 1% MF
R189	RM223 DHO	2K21 1/4W 1% MF

SERIES 7 MK2: PANORAMIC SYNC PCB: COMPONENTS LIST

RESISTORS

Circuit Reference	Component Reference	Component Description
R190	RM413 DHO	4K12 1/4W 1% MF
R191	RF335 DJO	330K 1/4W 5% CF

CAPACITORS

C120-123	CM105 8K6	100n 63V 10% MP
C124,125	CM335 8K6	330n 63V 10% MP

TRANSISTORS

TR107,108	QE7000 UUO	2N7000 FET

INTEGRATED CIRCUIT

IC110	IL0324 U2	LM324N Quad Amp

SERIES 7 MK2: PANORAMIC SYNC PCB: COMPONENTS LIST

PANORAMIC SYNC PCB AO3979.

The Components List is as for AO3638, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R133	RF684 DJO	68K 1/4W 5% C/F
R149	Not fitted	
R155	Not fitted	
R156	Not fitted	
R158	Not fitted	
R159	Not fitted	

CAPACITORS

C117	Not fitted	

DIODES

D104	DZ79510FBO	Zener BZX79B5V1 2%
TR107-109	Not fitted	

PANORAMIC SYNC PCB AO3181.

The Componet List is as for AO3638, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R105	RF103 DJO	1K0 1/4W 5% CF
R106	RF183 DJO	1K8 1/4W 5% CF
R108	RF473 DJO	4K7 1/4W 5% CF
R109	RF155 DJO	150K 1/4W 5% CF
R126	RF223 DJO	2K2 1/4W 5% CF
R127	RF334 DJO	33K 1/4W 5% CF
R128	RF274 DJO	27K 1/4W 5% CF
R129	RF563 DJO	5K6 1/4W 5% CF
R130	RF682 DJO	680R 1/4W 5% CF
R131	RF153 DJO	1K5 1/4W 5% CF
R132	RF105 DJO	100K 1/4W 5% CF
R133	RF683 DJO	6K8 1/4W 5% CF
R134	RF223 DJO	2K2 1/4W 5% CF
R149	Not fitted	
R151	RL101 GJO	10R 1/2W 5% FF
R153,155-159	Not fitted	

CAPACITORS

C103,109	CM105 NK6	100n 250V 10% MP
C112,115-120	Not fitted	

DIODES

D104	DZ79510 FBO	BZX79B5V1 2%

TRANSISTORS

TR101	QS0307 UU5	BC307-5
TR107-110	Not fitted	

PANORAMIC SYNC PCB AO4206 AND AO4233.

The Componet List is as for AO3638, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R105	RF103DJO	1K0 1/4W 5% CF
R106	Not Fitted	
R108	RM563DHO	5K62 1/4W 1% MF
R117	RM223DHO	2K21 1/4W 1% MF
R127	RM114DIO	11K 1/4W 1% MF
R133	RF565DJO	560K 1/4W 5% CF
R142	RF185DJO	180K 1/4W 5% CF

SERIES 7 MK2: TUBE BASE PCB

GENERAL

This section gives the following information on the Tube Base PCB for each Series 7 Mk 2 model.

Layout diagram Components List

These are identified by Drawing Numbers.

Table 1 in the Introduction to this manual relates Model Numbers to these Drawing Numbers, so that the drawings appropriate to a particular model may be selected.

The circuit is included in the circuit diagram for the Drive Deflection PCB, in an earlier section.

This circuit description is for the first circuit diagram in that section. Where other circuits differ significantly, supplementary descriptions are given as necessary.

The circuit for the CRT Tube Base and Video Output Stages is contained on a separate PCB assembly. This plugs directly onto the base of the CRT.

Circuit interconnections between the Tube Base PCB and the Drive-Deflection PCB are made by flexible interconnecting leads.

CIRCUIT DESCRIPTION

The Tube Base PCB contains the video output stages for all three channels, as well as the circuit for G1 and A1 and the tube base CRT SOCKET. All CRT electrodes are protected by a resistor, a spark gap and, in some cases, a capacitor returned to the aquadag ground. The spark gaps on all electrodes except Focus are formed by means of a 1 to 2kV ring trap gap within the CRT base socket. The high voltage focus has a separate 10kV spark chamber also integral with the tube base socket.

The CRT cathodes are driven directly from the video output stages on the Tube Base PCB. This improves reliability, enhances the video bandwidth, improves stability and minimises RF radiation.

The CRT heater voltage is derived direct from the power supply. The focus voltage and the A1 voltage are taken directly from the diode-split transformer. The A1 voltage is stood off from the cathode by an 820kohm resistor R944 and is decoupled by C921.

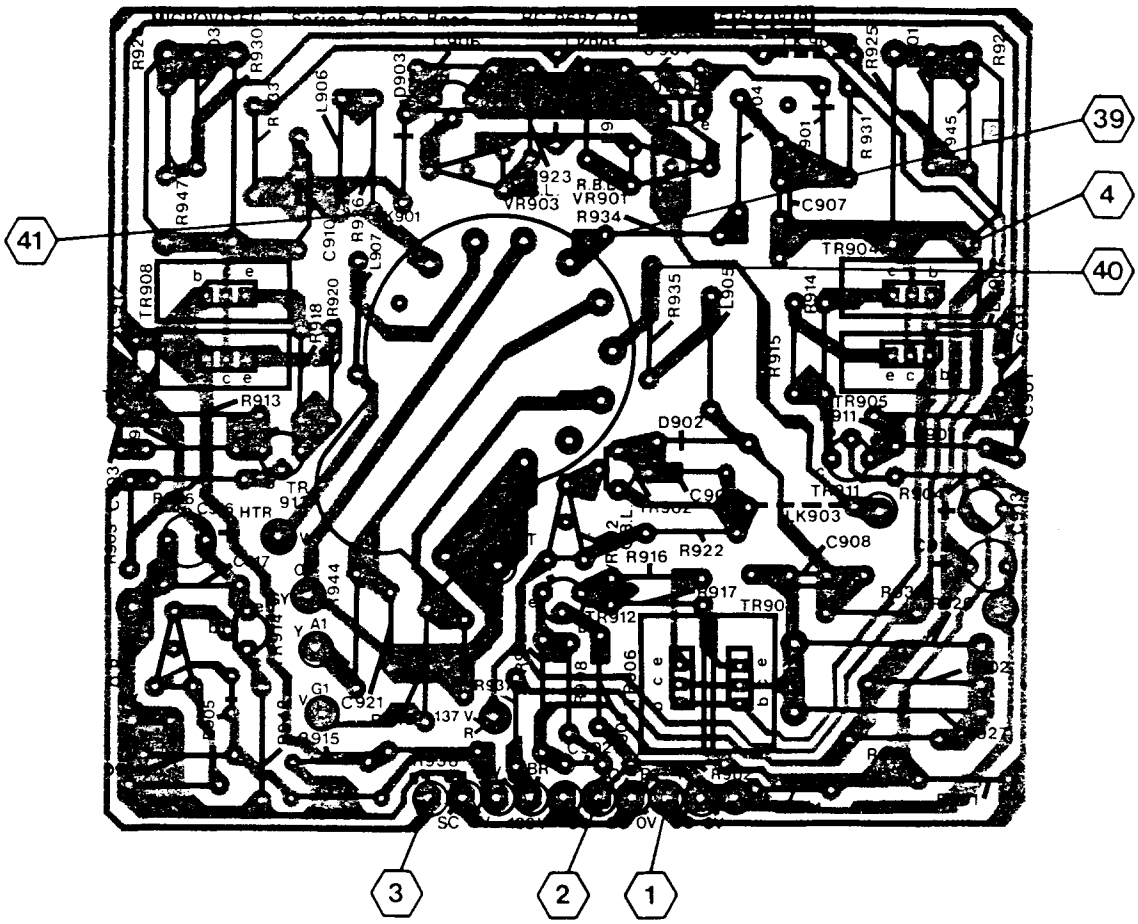
VIDEO OUTPUT STAGES

The video output stages are Class A, arranged as cascodes. The Red, Green and Blue video outputs have identical circuits. The circuits are constructed on a double sided PCB: one side has all circuit connections, the other provides a screen around the small-signal sections of each output stage. This improves HF stability, crosstalk, and reduces RF radiation. The two sides of the PCB are connected by three wire pins.

To describe the video output circuit, the Red Channel only will be considered. Transistors TR904 and TR905 behave as a single transistor Class A amplifier driven in cascode by TR911, thereby minimising the effect of Miller capacitance. Resistors R914 and R915 ensure current sharing between TR904 and TR905. AC and DC gain of the output stage is determined by the ratio of the load resistors (R924, R925) to the emitter resistor (R911), while AC compensation is provided by R907, C901.

Video from the Interface PCB assembly is fed in via R904, and is terminated signalwise, by R901 to the common emitter bias potential, derived in turn by TR914, VR904, R941, R942, D904, D905. The incoming signal consists of positive-going video information, negative-going mixed blanking, and a black-level clamped to a fixed DC potential. VR904 adjusts the emitter potential of TR914 in order to set the current of each video output stage to give 90V at black level at the output collectors. This ensures an adequate mixed blanking pedestal and optimises the video bandwidth. The bandwidth is extended by incorporating collector peaking choke L901.

SERIES 7 MK2: TUBE BASE PCB



TUBE-BASE PCB LAYOUT DIAGRAM

Notes
1 Track (Bottom Side) is shown 'viewed through the board.'
2 Symbol ⬡ denotes waveform measurement point with reference to: Drive/Deflection PCB Assembly Circuit Diagram.

TUBE BASE PCB TRACK AND IDENT

SERIES 7 MK2: TUBE BASE PCB: COMPONENTS LIST

COMPONENTS LIST

A Component List is given for one PCB, under its Assembly number. A list of differences is given for each variant of that PCB, un der its own Assembly number.

The appropriate Assembly number for a PCB in a particular model may be found by reference to Table 1 in the Introduction to this Manual.

In the Components Lists, the following abbreviations are used.

RESISTORS

CC Carbon Composition

CF Carbon Film

MF Metallised Film

MO Metal Oxide

TH Thermistor

WW Wire Wound

CAPACITORS

AE Aluminium Electrolytic

C Ceramic

CT Ceramic Tube

MP Metallised Polymer

PC Poly Carbonate

PS Polystyrene

T Tantalum

PTC Positive Temperature Coefficient.

TUBE BASE PCB AO3638, AO4012, AO4195, AO3979, AO4206, AO4233.

RESISTORS

Circuit Reference	Component Reference	Component Description
R901-903	RF751 DJO	75R 1/4W 5% CF
R904-906	RF102 DJO	100R 1/4W 5% CF
R907,908,910	RF101 DJO	10R 1/4W 5% CF
R911-913	RF561 GJO	56R 1/2W 5% CF
R914-918,920,941	RF331 DJO	33R 1/4W 5% CF
R921-923	RF824 DJO	82K 1/4W 5% CF
R924-928,930	RO223 PJO	2K2 4W 5% MO
R931-933	RF106 DJO	1MO 1/4W 5% CF
R934-936	RK222 GKO	220R 1/2W 10% CC
R937	RF330 DJO	3R3 1/4W 5% CF
R938	RL101 DJO	10R 1/4W 5% MF
R940	RF152 DJO	150R 1/4W 5% CF
R942	RL470 GJO	4R7 1/2W 5% FF
R943	RX105 GKO	100K 1/2W 10% CC
R944	RK825 GKO	820K 1/2W 10% CC

SERIES 7 MK2: TUBE BASE PCB: COMPONENTS LIST

CAPACITORS

Circuit Reference	Component Reference	Component Description
C901-903	CC122 KIG	120p 100V 2% CF
C904-906, 914,915,917	CM105 NKG	100n 250V 10% MP
C907,908,910	CM685 KK6	680n 100V 10% MP
C911,912	CM475 8K6	470n 63V 10% MP
C913,916	CA108 FM7	100u 25V AE
C918	CA476 ML7	4.7u 160V 20% AE
C920,921	CD104 YP7	10n 2KV 30% C

DIODES

D901-903	DS0020 UPO	BAV 20
D904	DZ79820 FBO	Zener BZX79B8V2
D905	DZ79510 FBO	Zener BZX79B5V1

TRANSISTORS

TR901-903	QS0092 UU5	MPSA92 PNP
TR904-908,910	QS058 ULO	BF585
TR911-913	QS0020 UUO	BSX20
TR914	QS0750 KF6	ZTX750

POTENTIOMETERS

VR901-903	RQ474 AL2	47K Preset
VR904	RQ102 AL2	100R Preset

INDUCTORS

L901-903	LW104 BK1	10uH,1205100K
L904-906	LW473 SK2	4u7,B78108
L907	LW104 SK1	10uH,B78108-91103-X

SERIES 7 MK2: TUBE BASE PCB: COMPONENTS LIST

TUBE BASE PCB AO3181.

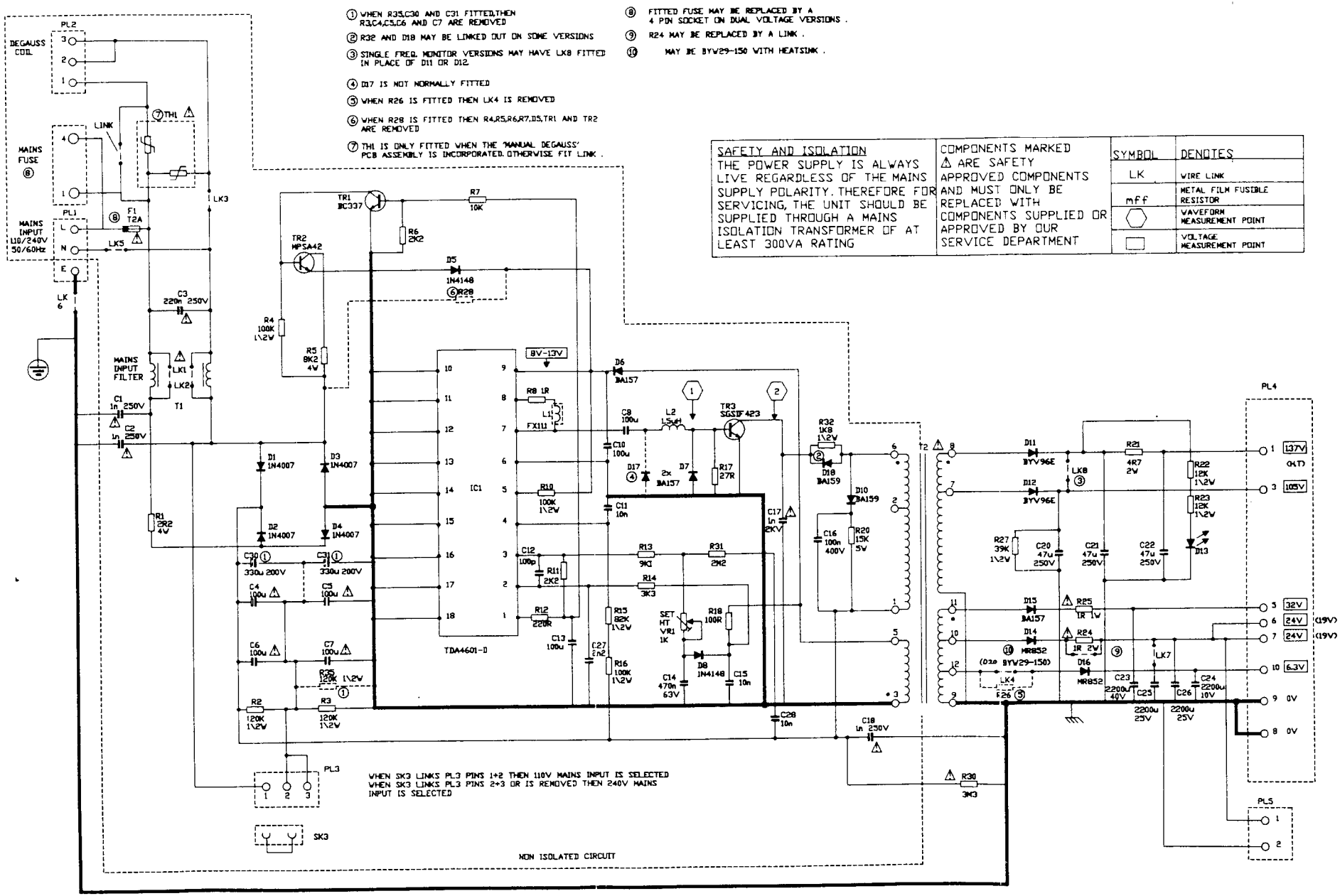
The Components List is as for AO3638, with the following exceptions.

RESISTORS

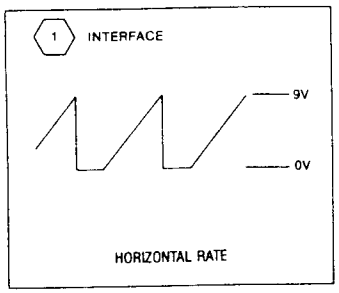
Circuit Reference	Component Reference	Component Description
R941	RF122 DJO	120R 1/4W 5% CF
R942	RF151 GJO	15R 1/2W 5% CF

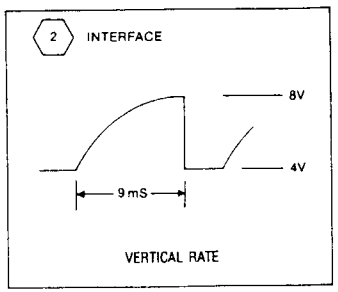
DIODES

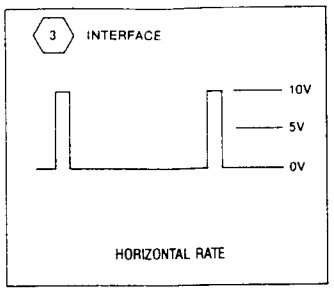
D904	DZ79510 FBO	Zener BZX79B5V1 2%
D905	Not fitted	

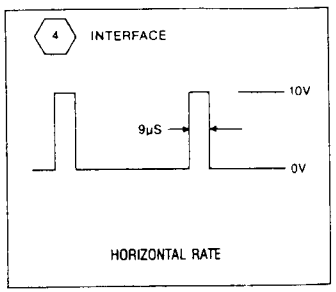


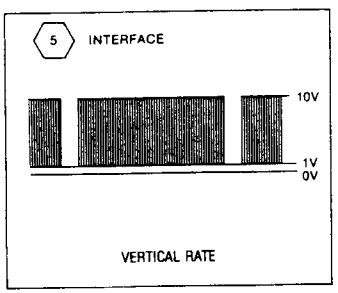
14" & 20" MODELS INCLUDING 604/704

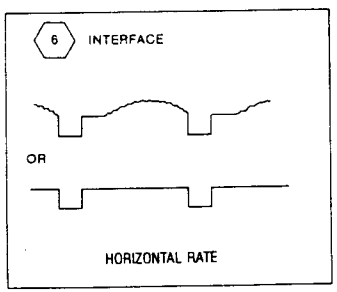


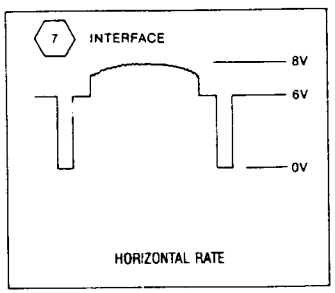


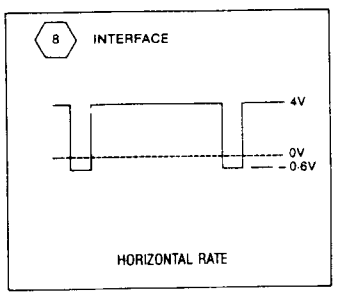


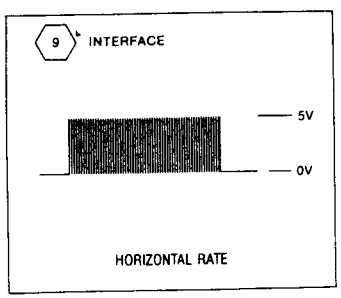


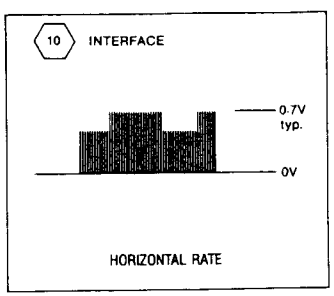


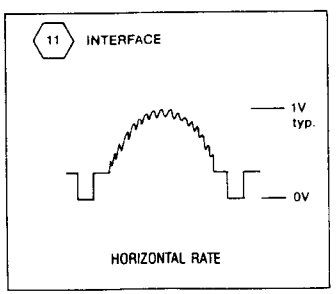












SAFETY AND ISOLATION!

The power supply is always live regardless of the mains supply polarity. Therefore for servicing, the monitor should be supplied through a mains Isolation Transformer of at least 300VA rating.
(See 'SAFETY NOTES' in SERVICE MANUAL).

SAFETY CRITICAL COMPONENTS

Components marked ⚠ on the circuit diagram and parts list are safety approved types and should only be replaced with components supplied or approved by our Service Department. It is recommended that other replaced parts should be of the type originally fitted, particularly resistors stood off the printed circuit boards.
FAILURE TO OBSERVE THE ABOVE MAY RENDER THE CHASSIS AND EXTERNAL ACCESSIBLE PARTS LIVE, OR CAUSE OTHER HAZARDS!

WAVEFORM MEASUREMENT POINTS

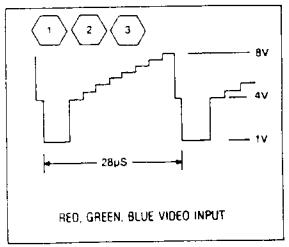
Waveform points are denoted thus (3)

1) The numerical reference point on the circuit diagram relates to the corresponding numbered display on the accompanying table.
2) Waveform measurements were made using an oscilloscope of 20MHz minimum bandwidth and a ÷10 or ÷100 passive probe.

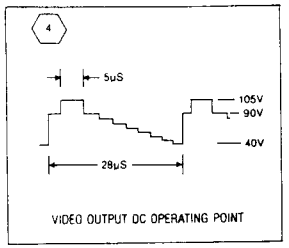
TYPICAL VOLTAGES - MEASUREMENT POINTS

1) Voltages denoted thus [3·0V] on the circuit diagram, are typical voltages only, and were measured using a high input impedance D.V.M.
2) Alternatively, Analogue meters of 20 KΩ/Volt minimum can be used.

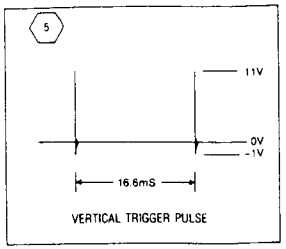
20" AND 14" MODELS INTERFACE PCB WAVEFORMS



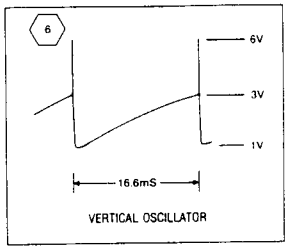
RED, GREEN, BLUE VIDEO INPUT



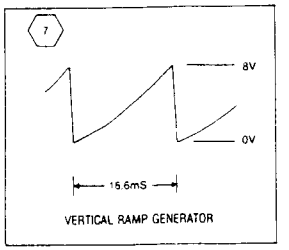
VIDEO OUTPUT DC OPERATING POINT



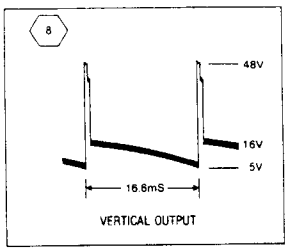
VERTICAL TRIGGER PULSE



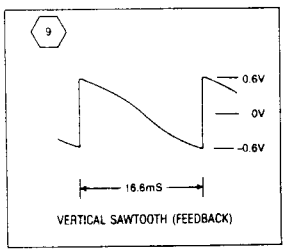
VERTICAL OSCILLATOR



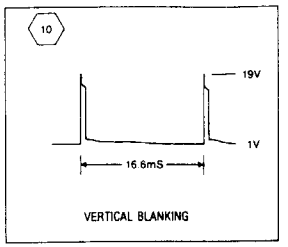
VERTICAL RAMP GENERATOR



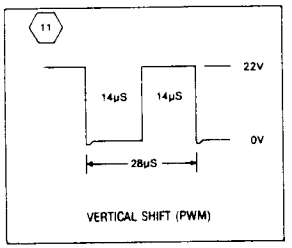
VERTICAL OUTPUT



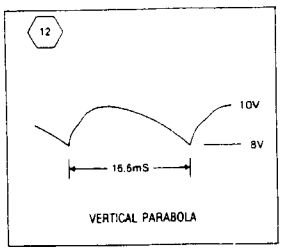
VERTICAL SAWTOOTH (FEEDBACK)



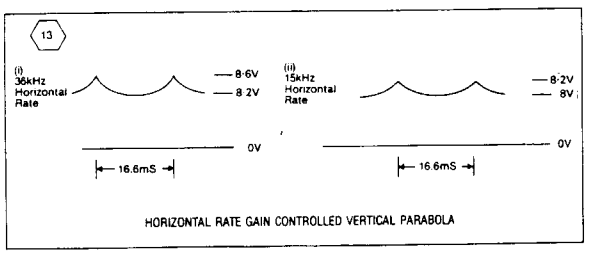
VERTICAL BLANKING



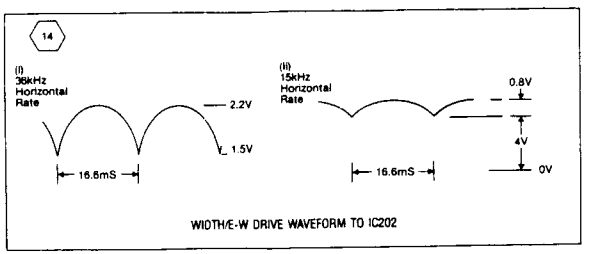
VERTICAL SHIFT (PWM)



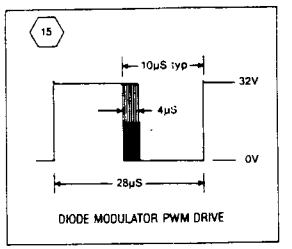
VERTICAL PARABOLA



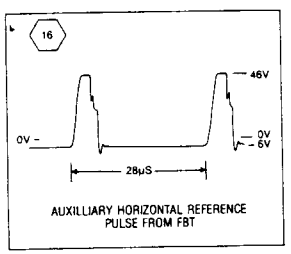
HORIZONTAL RATE GAIN CONTROLLED VERTICAL PARABOLA



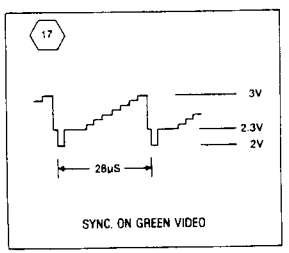
WIDTH/E-W DRIVE WAVEFORM TO IC202



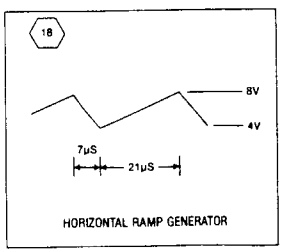
DIODE MODULATOR PWM DRIVE



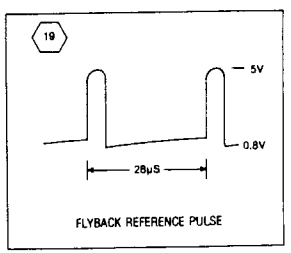
AUXILLIARY HORIZONTAL REFERENCE PULSE FROM FBT



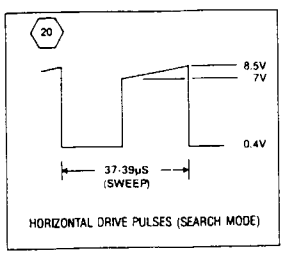
SYNC. ON GREEN VIDEO



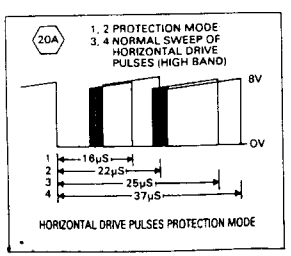
HORIZONTAL RAMP GENERATOR



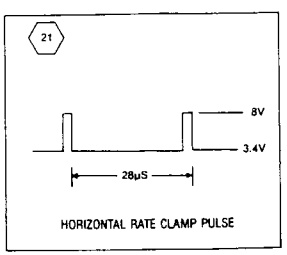
FLYBACK REFERENCE PULSE



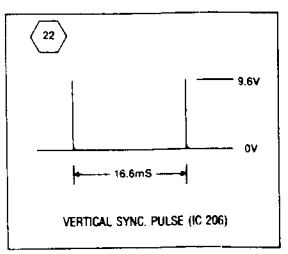
HORIZONTAL DRIVE PULSES (SEARCH MODE)



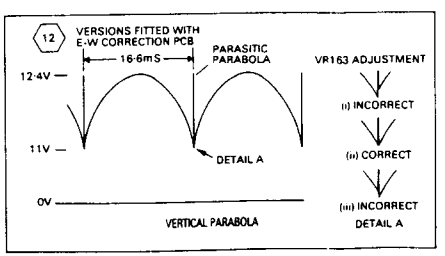
HORIZONTAL DRIVE PULSES PROTECTION MODE



HORIZONTAL RATE CLAMP PULSE



VERTICAL SYNC. PULSE (IC 206)



DRIVE/DEFLECTION PCB WAVEFORMS

SAFETY AND ISOLATION!

The power supply is always live regardless of the mains supply polarity. Therefore for servicing, the monitor should be supplied through a mains isolation Transformer of at least 300VA rating.
(See 'SAFETY NOTES' in SERVICE MANUAL).

SAFETY CRITICAL COMPONENTS

Components marked ⚠ on the circuit diagram and parts list are safety approved types and should only be replaced with components supplied or approved by our Service Department. It is recommended that other replaced parts should be of the type originally fitted, particularly resistors stood off the printed circuit boards.
FAILURE TO OBSERVE THE ABOVE MAY RENDER THE CHASSIS AND EXTERNAL ACCESSIBLE PARTS LIVE, OR CAUSE OTHER HAZARDS!

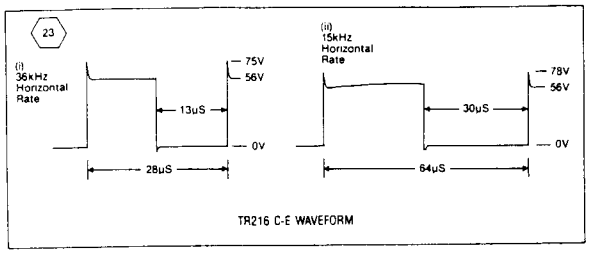
WAVEFORM MEASUREMENT POINTS

Waveform points are denoted thus (3)

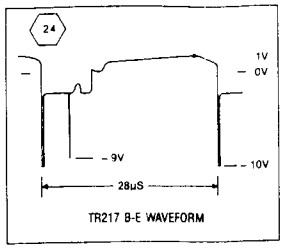
1) The numerical reference point on the circuit diagram relates to the corresponding numbered display on the accompanying table,
2) Waveform measurements were made using an oscilloscope of 20MHz minimum bandwidth and a ÷10 or ÷100 passive probe.

TYPICAL VOLTAGES - MEASUREMENT POINTS

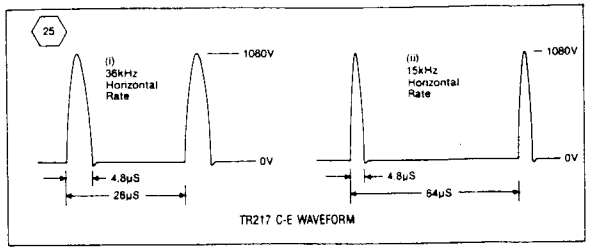
1) Voltages denoted thus 3·0V on the circuit diagram, are typical voltages only, and were measured using a high input impedance D.V.M.
2) Alternatively, Analogue meters of 20 KΩ/Volt minimum can be used.



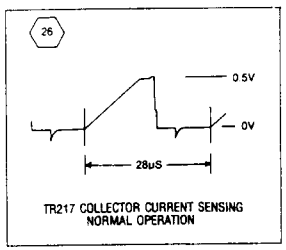
TR216 C-E WAVEFORM



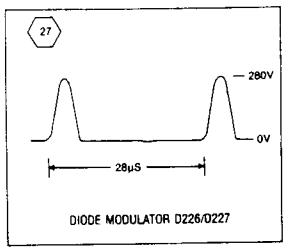
TR217 B-E WAVEFORM



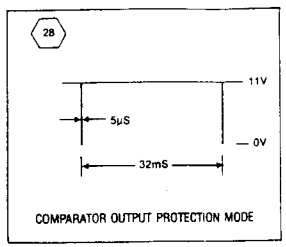
TR217 C-E WAVEFORM



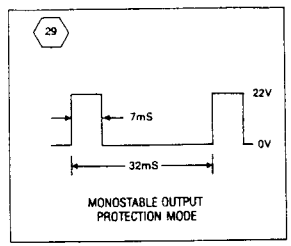
TR217 COLLECTOR CURRENT SENSING NORMAL OPERATION



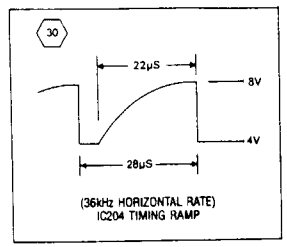
DIODE MODULATOR D226/0227



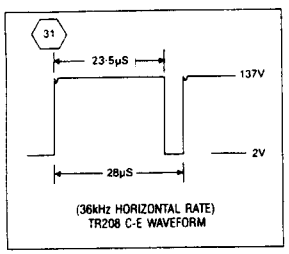
COMPARATOR OUTPUT PROTECTION MODE



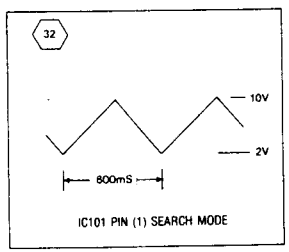
MONOSTABLE OUTPUT PROTECTION MODE



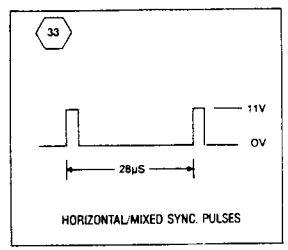
(36kHz HORIZONTAL RATE) IC204 TIMING RAMP



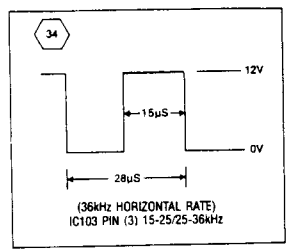
(36kHz HORIZONTAL RATE) TR208 C-E WAVEFORM



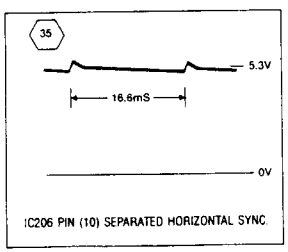
IC101 PIN (1) SEARCH MODE



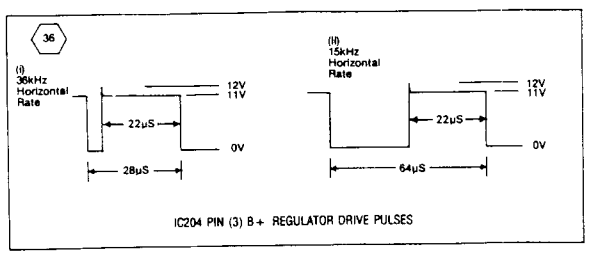
HORIZONTAL/MIXED SYNC. PULSES



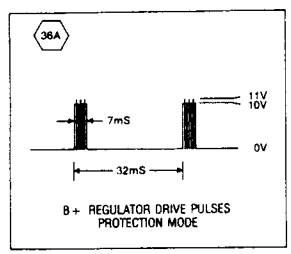
(36kHz HORIZONTAL RATE) IC103 PIN (3) 15-25/25-36kHz



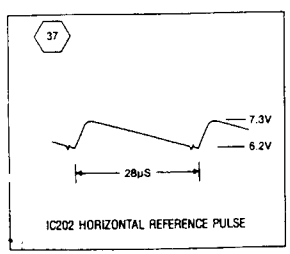
IC206 PIN (10) SEPARATED HORIZONTAL SYNC.



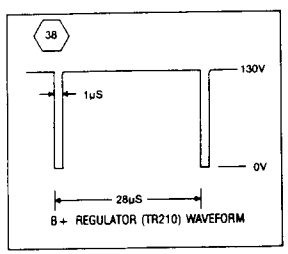
IC204 PIN (3) B+ REGULATOR DRIVE PULSES



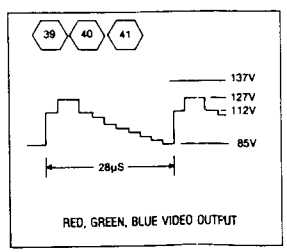
B+ REGULATOR DRIVE PULSES PROTECTION MODE



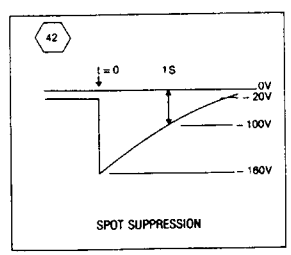
IC202 HORIZONTAL REFERENCE PULSE



B+ REGULATOR (TR210) WAVEFORM



RED, GREEN, BLUE VIDEO OUTPUT



SPOT SUPPRESSION

DRIVE/DEFLECTION PCB WAVEFORMS

SAFETY AND ISOLATION!

The power supply is always live regardless of the mains supply polarity. Therefore for servicing, the monitor should be supplied through a mains Isolation Transformer of at least 300VA rating.
(See 'SAFETY NOTES' in SERVICE MANUAL).

SAFETY CRITICAL COMPONENTS

Components marked ⚠ on the circuit diagram and parts list are safety approved types and should only be replaced with components supplied or approved by our Service Department. It is recommended that other replaced parts should be of the type originally fitted, particularly resistors stood off the printed circuit boards.
FAILURE TO OBSERVE THE ABOVE MAY RENDER THE CHASSIS AND EXTERNAL ACCESSIBLE PARTS LIVE, OR CAUSE OTHER HAZARDS!

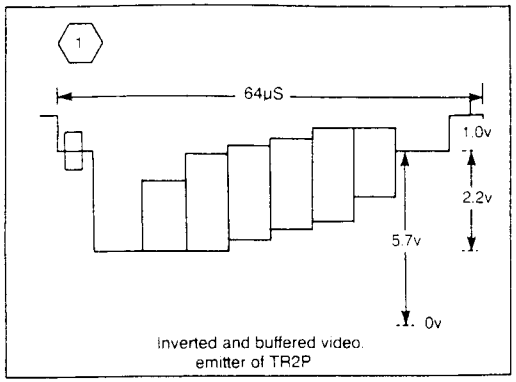
WAVEFORM MEASUREMENT POINTS

Waveform points are denoted thus (3)

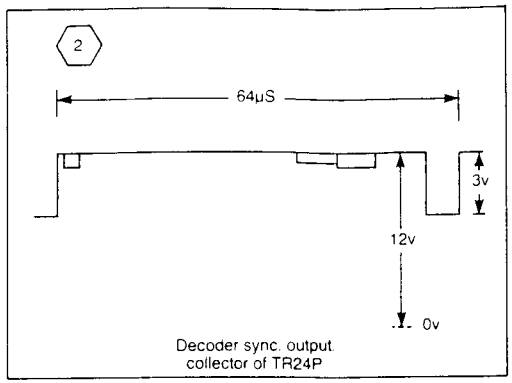
1) The numerical reference point on the circuit diagram relates to the corresponding numbered display on the accompanying table.
2) Waveform measurements were made using an oscilloscope of 20MHz minimum bandwidth and a ÷10 or ÷100 passive probe.

TYPICAL VOLTAGES - MEASUREMENT POINTS

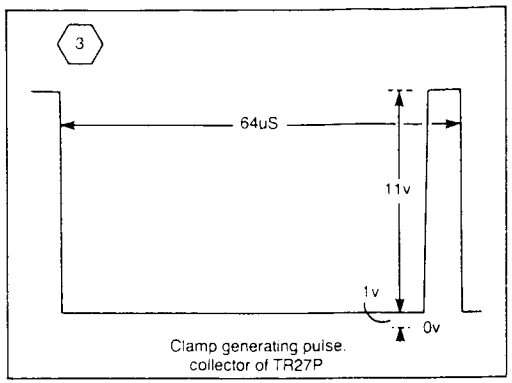
1) Voltages denoted thus [3·0V] on the circuit diagram, are typical voltages only, and were measured using a high input impedance D.V.M.
2) Alternatively, Analogue meters of 20 KΩ/Volt minimum can be used.



Inverted and buffered video.
emitter of TR2P



Decoder sync. output
collector of TR24P



Clamp generating pulse.
collector of TR27P

WAVEFORM MEASUREMENT POINTS

Waveform points are denoted thus (3)

1) The numerical reference point on the circuit diagram relates to the corresponding numbered display on the accompanying table.

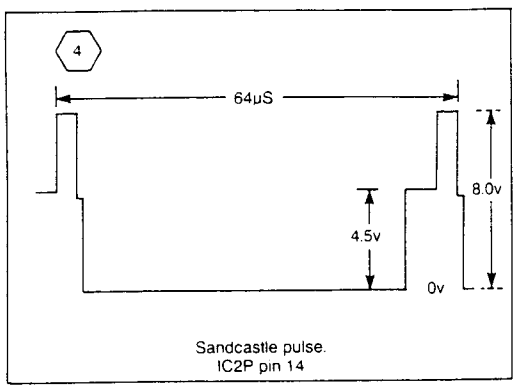
2) Waveform measurements were made using an oscilloscope of 20MHz minimum bandwidth and a ÷10 or ÷100 passive probe.

TYPICAL VOLTAGES — MEASUREMENT POINTS

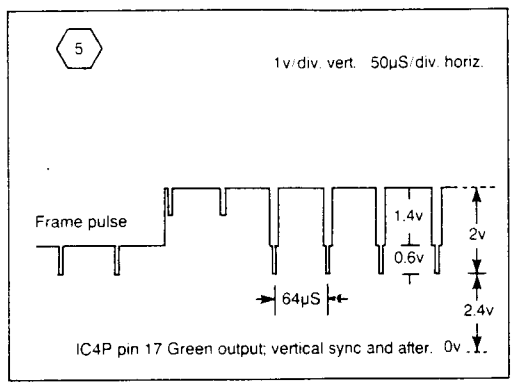
3.0V

1) Voltages denoted thus on the circuit diagram, are typical voltages only, and were measured using a high input impedance D.V.M.

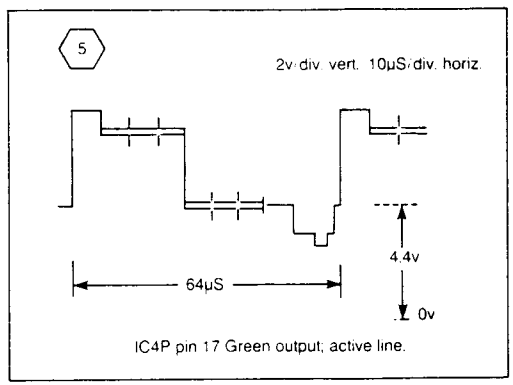
2) Alternatively, Analogue meters of 20 k /Volt minimum can be used.



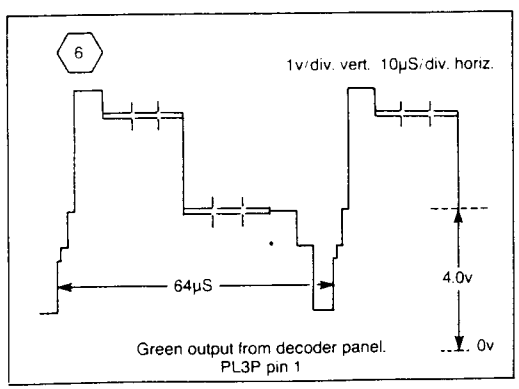
Sandcastle pulse.
IC2P pin 14



IC4P pin 17 Green output; vertical sync and after. 0v

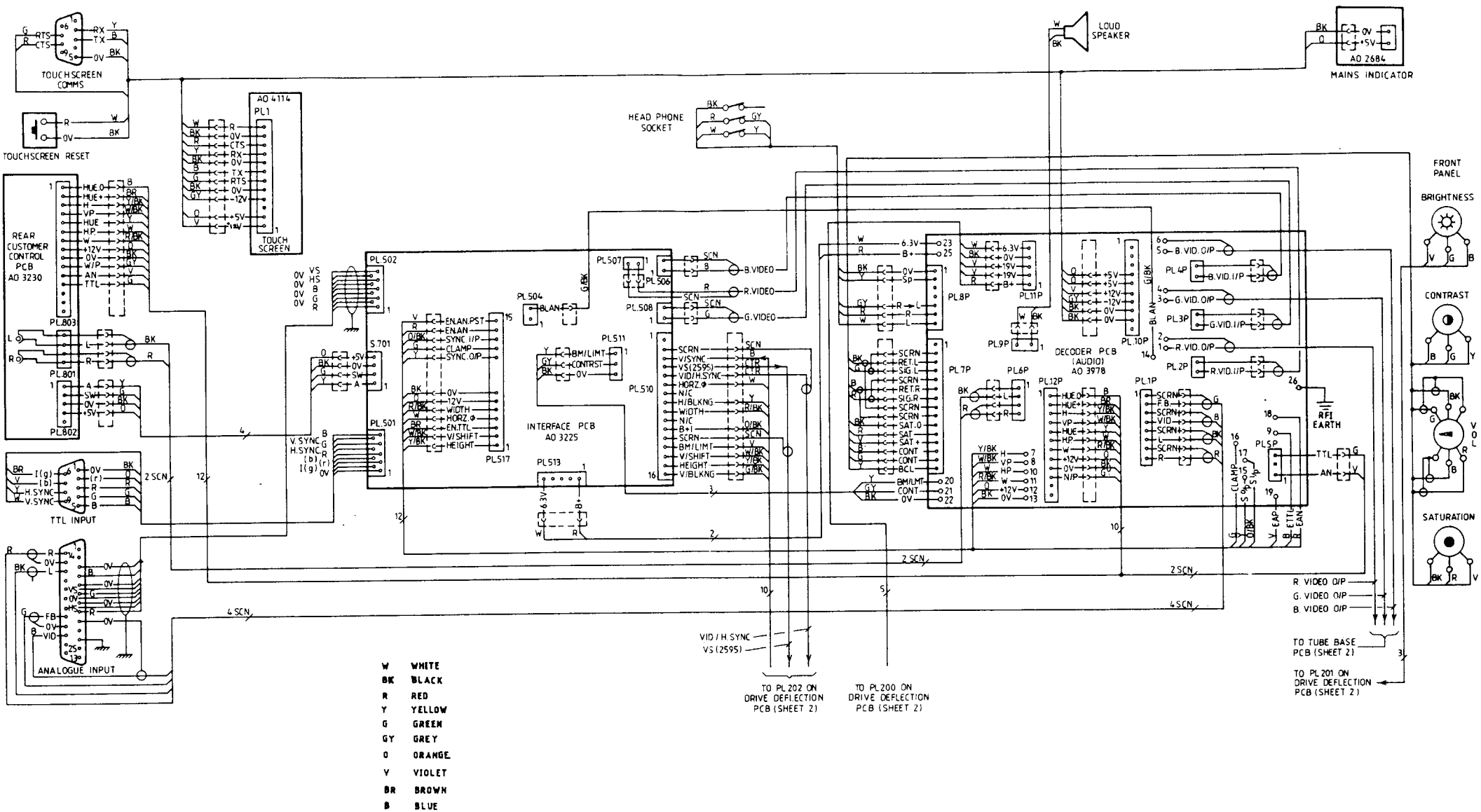


IC4P pin 17 Green output; active line.

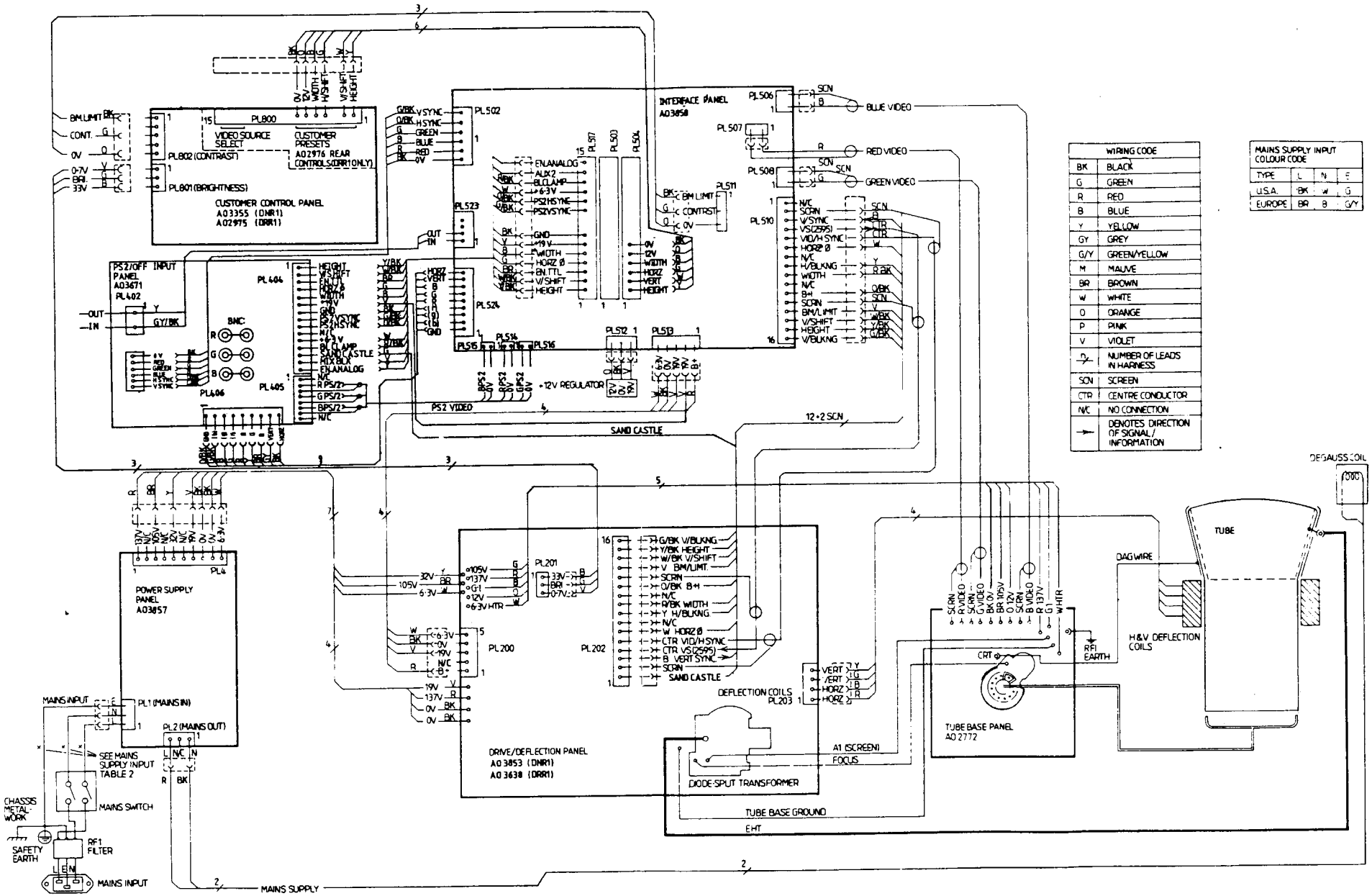


Green output from decoder panel.
PL3P pin 1

DECODER PANEL WAVEFORMS



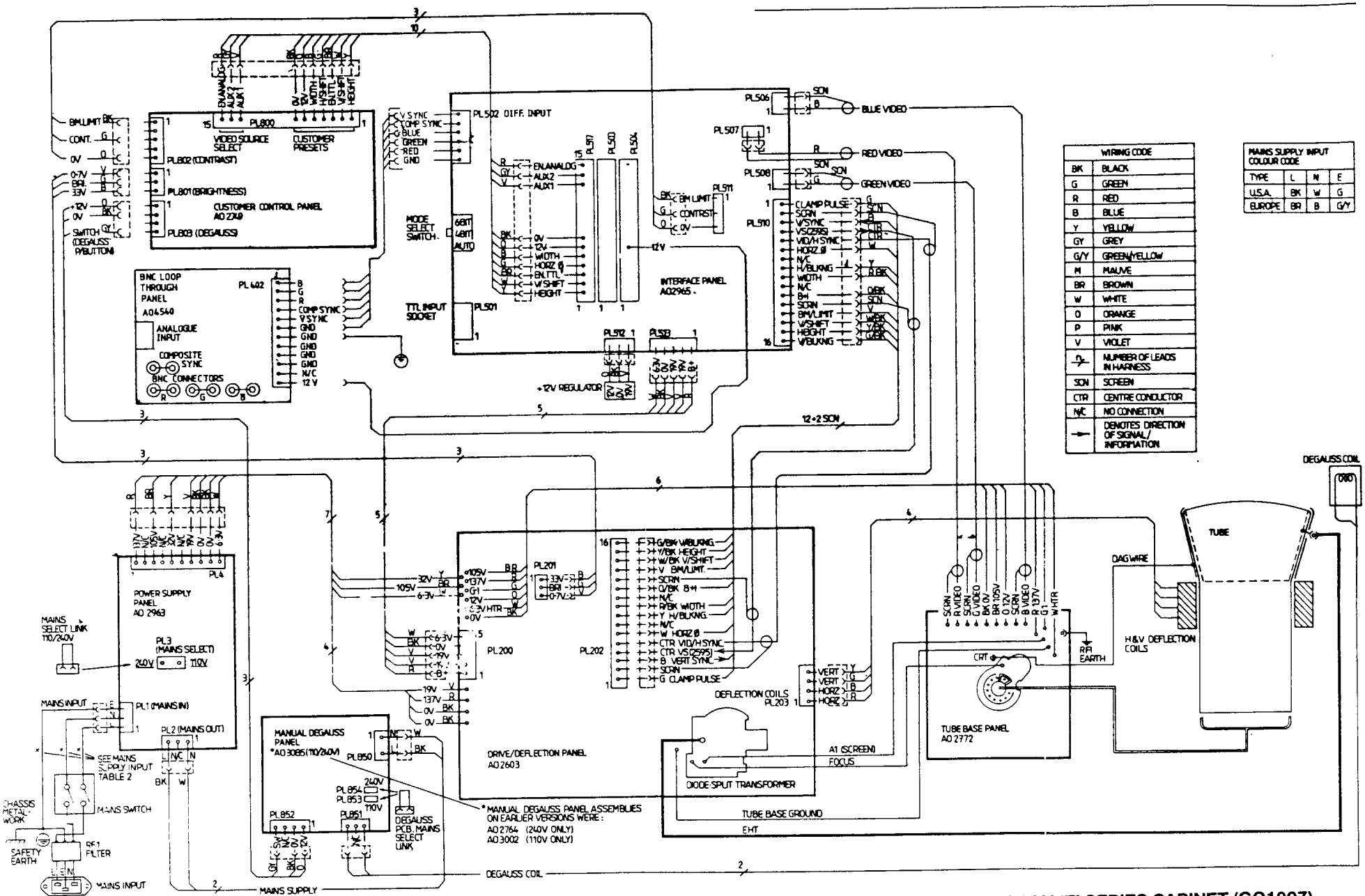
INTERCONNECTION DIAGRAM 'F' SERIES CABINET (GO1716)
MODELS 604 & 704 SHEET 1 OF 2



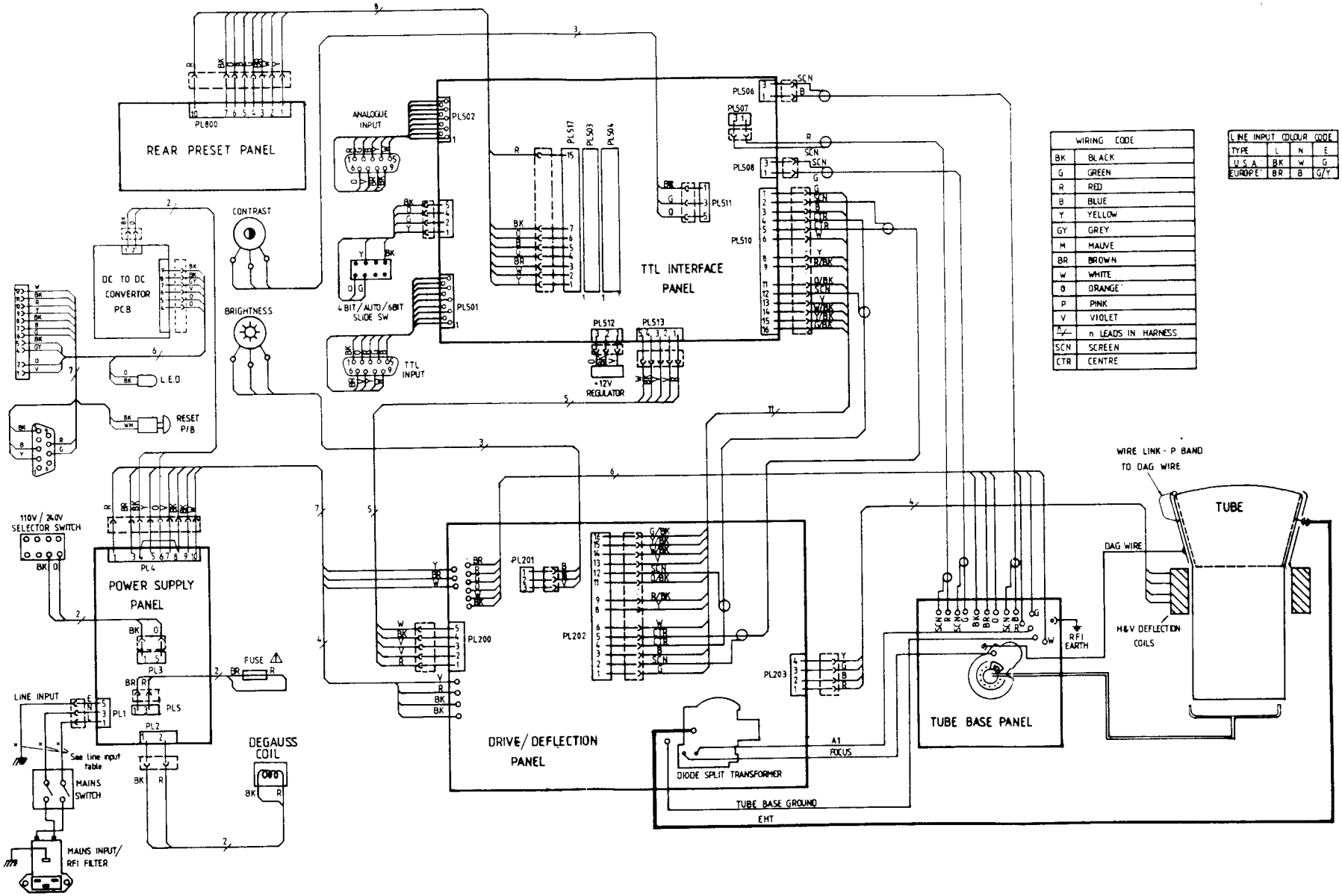
WIRING CODE	
BK	BLACK
G	GREEN
R	RED
B	BLUE
Y	YELLOW
GY	GREY
G/Y	GREEN/YELLOW
M	MAUVE
BR	BROWN
W	WHITE
O	ORANGE
P	PINK
V	VIOLET
2	NUMBER OF LEADS IN HARNESS
SCN	SCREEN
CTR	CENTRE CONDUCTOR
N/C	NO CONNECTION
→	DENOTES DIRECTION OF SIGNAL / INFORMATION

MAINS SUPPLY INPUT COLOUR CODE			
TYPE	L	N	E
U.S.A.	BK	W	G
EUROPE	BR	B	G/Y

INTERCONNECTION DIAGRAM 'N' & 'R' SERIES CABINET (GO1906)



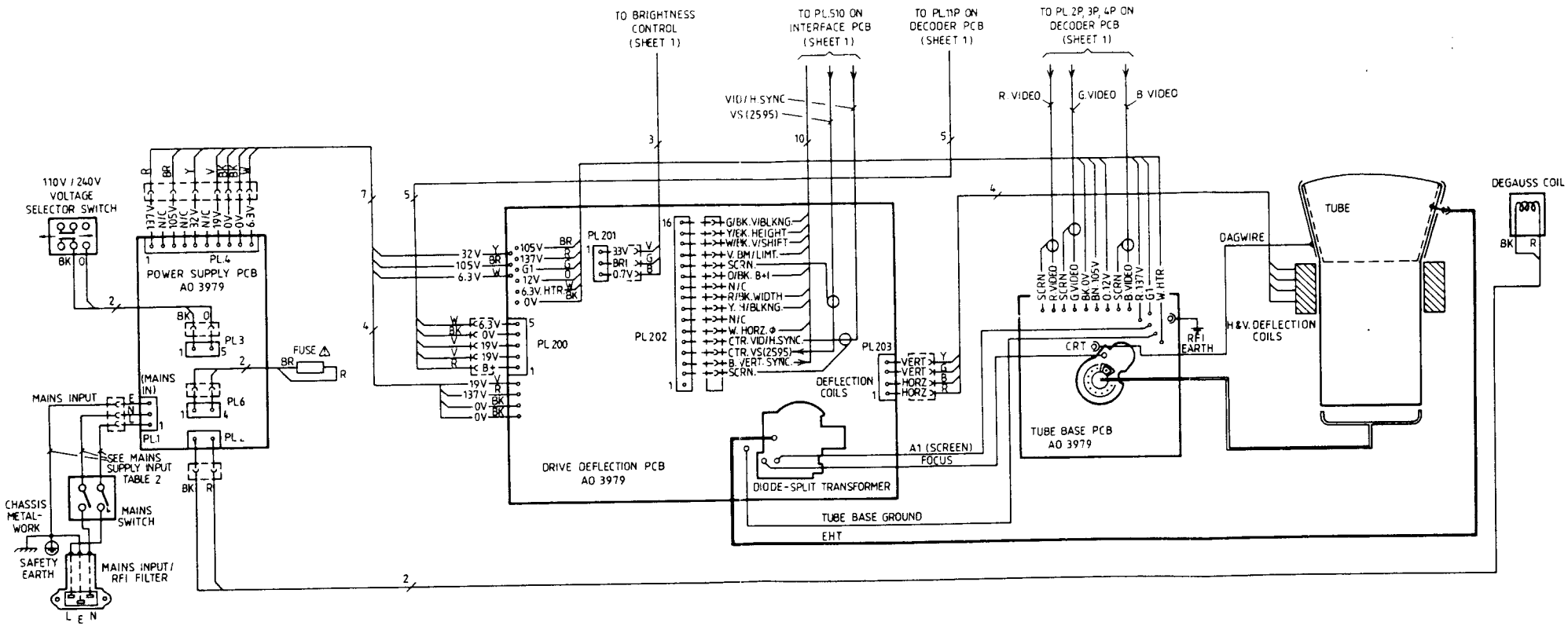
INTERCONNECTION DIAGRAM 'E' SERIES CABINET (GO1907)



WIRING CODE	
BK	BLACK
G	GREEN
R	RED
B	BLUE
Y	YELLOW
GY	GREY
M	MAUVE
BR	BROWN
W	WHITE
O	ORANGE
P	PINK
V	VIOLET
n/-	n LEADS IN HARNESS
SCN	SCREEN
CTR	CENTRE

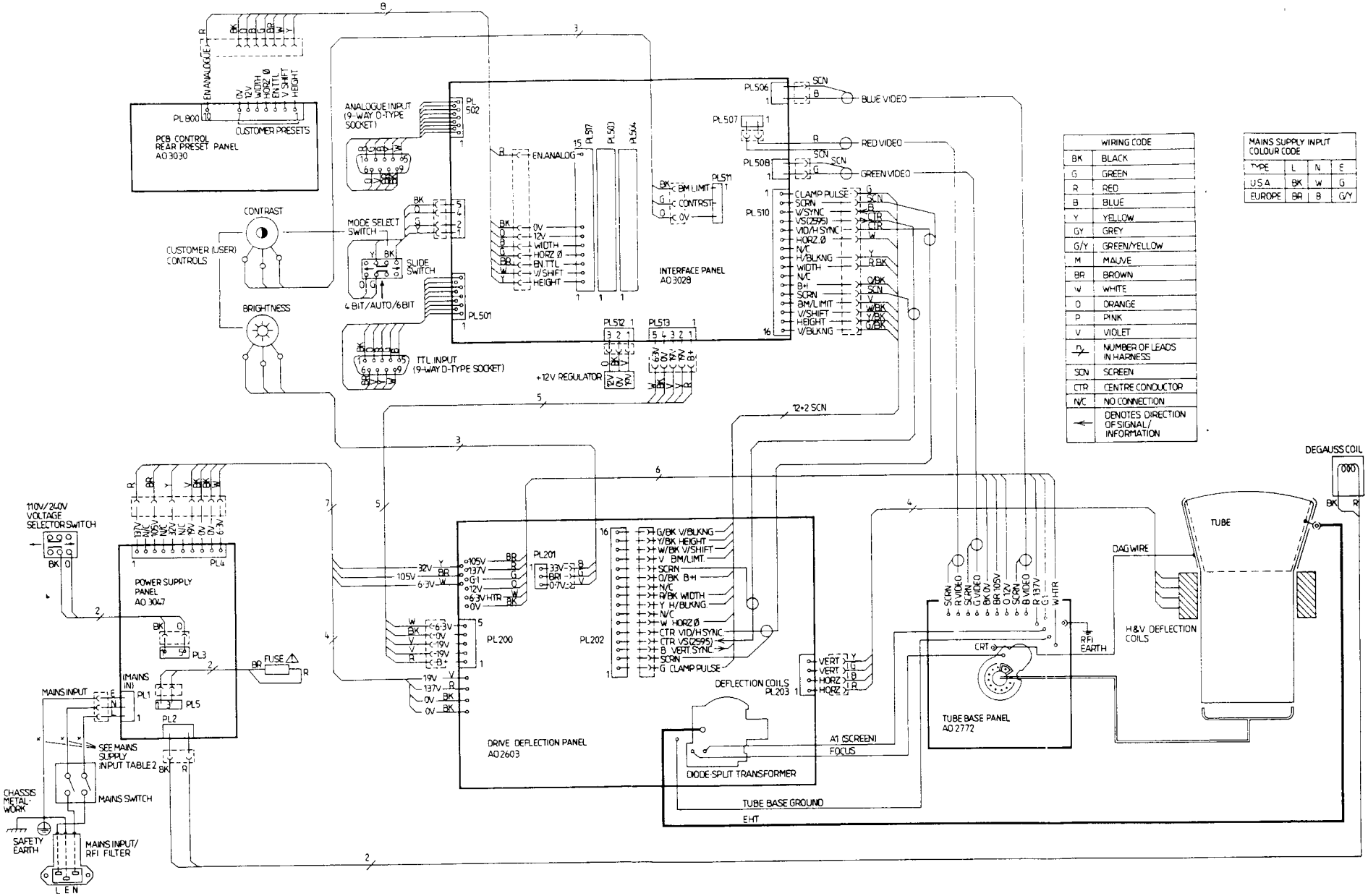
LINE INPUT COLOUR CODE			
TYPE	L	N	E
U.S.A.	BK	W	G
EUROPE	BR	B	G/Y

INTERCONNECTION DIAGRAM 'F' SERIES CABINET (GO1366)
MODEL 705 ONLY



W	WHITE
BK	BLACK
R	RED
Y	YELLOW
G	GREEN
GY	GREY
O	ORANGE
V	VIOLET
BR	BROWN
B	BLUE

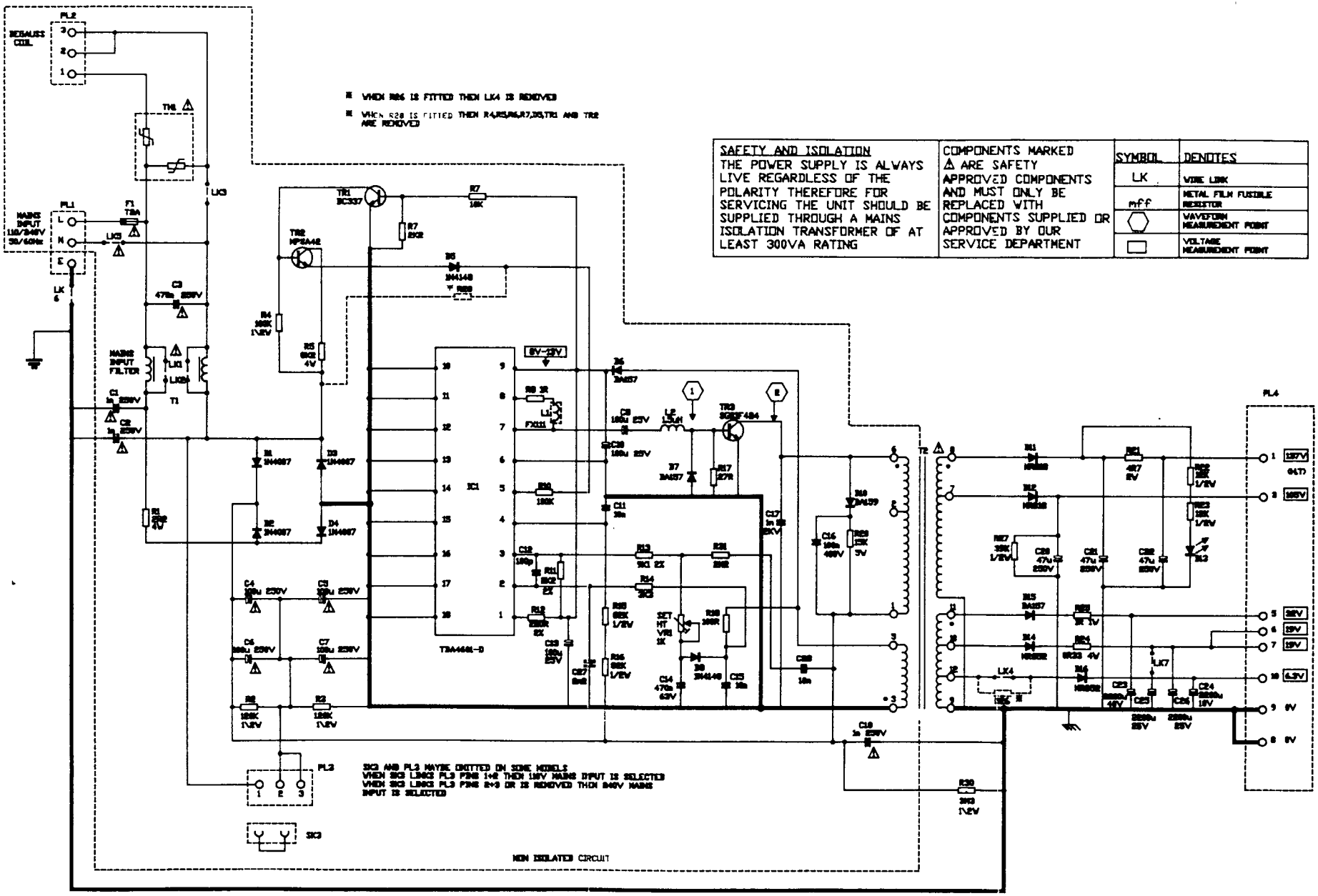
INTERCONNECTION DIAGRAM 'F' SERIES CABINET (GO1716)
MODELS 604 & 704 SHEET 2 OF 2



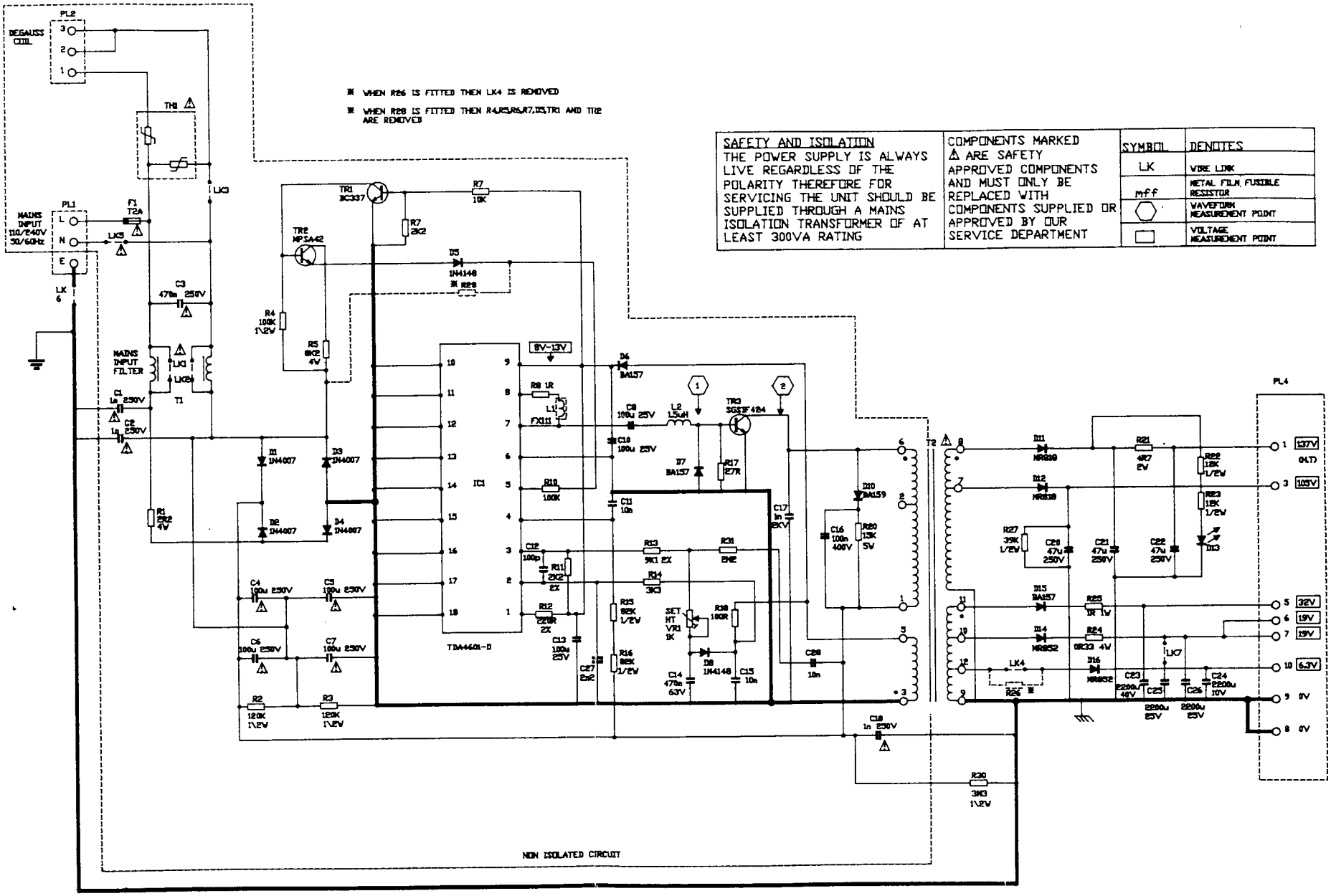
WIRING CODE	
BK	BLACK
G	GREEN
R	RED
B	BLUE
Y	YELLOW
GY	GREY
G/Y	GREEN/YELLOW
M	MAUVE
BR	BROWN
W	WHITE
O	ORANGE
P	PINK
V	VIOLET
n/	NUMBER OF LEADS IN HARNESS
SCN	SCREEN
CTR	CENTRE CONDUCTOR
N/C	NO CONNECTION
←	DENOTES DIRECTION OF SIGNAL/ INFORMATION

MAINS SUPPLY INPUT COLOUR CODE			
TYPE	L	N	E
USA	BK	W	G
EUROPE	BR	B	G/Y

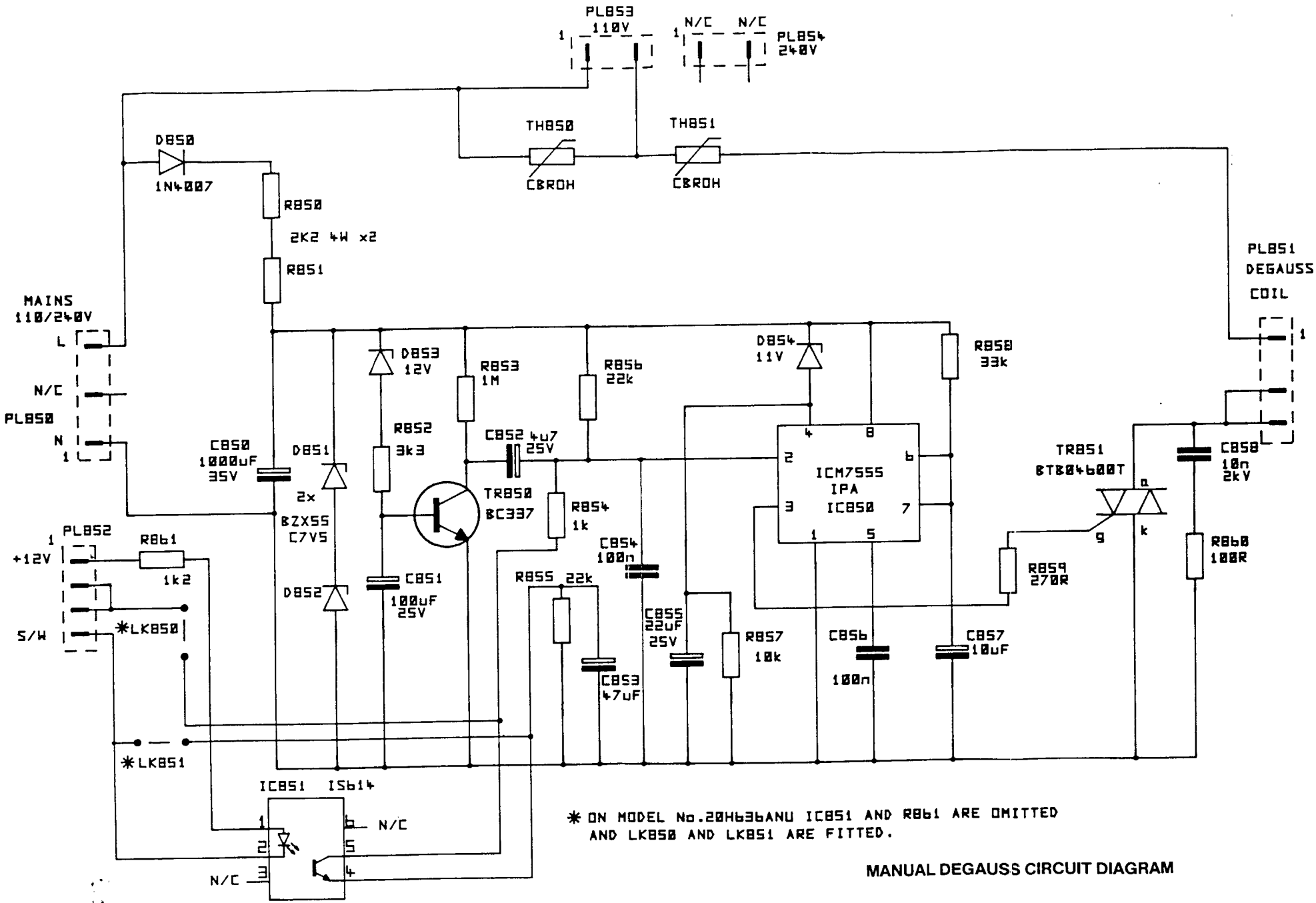
INTERCONNECTION DIAGRAM 'T' SERIES CABINET (GO1177)


SAFETY AND ISOLATION
THE POWER SUPPLY IS ALWAYS LIVE REGARDLESS OF THE POLARITY THEREFORE FOR SERVICING THE UNIT SHOULD BE SUPPLIED THROUGH A MAINS ISOLATION TRANSFORMER OF AT LEAST 300VA RATING
COMPONENTS MARKED ⚠ ARE SAFETY APPROVED COMPONENTS AND MUST ONLY BE REPLACED WITH COMPONENTS SUPPLIED OR APPROVED BY OUR SERVICE DEPARTMENT
SYMBOL
DENOTES
LK
WIRE LINK
mff
METAL FILM FUSIBLE RESISTOR
WAVEFORM MEASUREMENT POINT
VOLTAGE MEASUREMENT POINT
NON ISOLATED CIRCUIT

12" MODELS EXCEPT 12L71DNS3


* WHEN R26 IS FITTED THEN LK4 IS REMOVED
* WHEN R28 IS FITTED THEN R4,R5,R6,R7,D5,TR1 AND TR2 ARE REMOVED
SAFETY AND ISOLATION
THE POWER SUPPLY IS ALWAYS LIVE REGARDLESS OF THE POLARITY THEREFORE FOR SERVICING THE UNIT SHOULD BE SUPPLIED THROUGH A MAINS ISOLATION TRANSFORMER OF AT LEAST 300VA RATING
COMPONENTS MARKED ⚠ ARE SAFETY APPROVED COMPONENTS AND MUST ONLY BE REPLACED WITH COMPONENTS SUPPLIED OR APPROVED BY OUR SERVICE DEPARTMENT
SYMBOL
DENOTES
LK
WIRE LINK
mff
METAL FILM FUSIBLE RESISTOR
WAVEFORM MEASUREMENT POINT
VOLTAGE MEASUREMENT POINT
DEGAUSS COIL
MAINS INPUT 110/240V 50/60Hz
MAINS INPUT FILTER
TDA4601-D
8V-13V
NON ISOLATED CIRCUIT
137V
105V
32V
19V
19V
6.3V
9V
9V

12L71DNS3 MODELS



* ON MODEL No.20H636ANU IC851 AND R861 ARE OMITTED AND LK850 AND LK851 ARE FITTED.

MANUAL DEGAUSS CIRCUIT DIAGRAM

SERIES 7 MK2: DRIVE/DEFLECTION PCB

GENERAL

This section gives the following information on the Drive/Deflection PCB for each Series 7 Mk 2 model.

Circuit diagram Waveform diagram

Layout diagram Components List

These are identified by Drawing Numbers.

Table 1 in the Introduction to this manual relates Model Numbers to these Drawing Numbers, so that the drawings appropriate to a particular model may be selected.

A circuit description is given for the first circuit diagram in this section. Where other circuits differ significantly, supplementary descriptions are given as necessary.

CIRCUIT DESCRIPTION (Assembly No. AO 3638, Circuit No. GO 1452)

VERTICAL DEFLECTION

The vertical deflection circuit is based on a type TDA 8176 Integrated circuit. This is a package variant on the TDA 1170N device, permitting use at higher power levels. This device, Circuit reference IC200, contains the functions of Vertical Oscillator/Ramp Generator/Power Amplifier and Flyback generator.

VERTICAL OSCILLATOR AND SYNC

The vertical oscillator timing components are formed by R204 and C201. These components ensure that the free- running frequency of the oscillator is lower than the lowest vertical frequency at which lock is required. In operation, C201 charges via R204 until it reaches a threshold voltage. The IC200 then conducts, discharging C201 rapidly to a lower threshold voltage. A positive- going sawtooth is thus presented across C201. To synchronise the oscillator, a positive going pulse is applied to the ground end of C201. This pulse is coupled to IC200 pin 15 by C201, and forces the voltage at this pin through the upper threshold, so causing the oscillator to reset prematurely.

VERTICAL OSCILLATOR/RAMP GENERATOR

The oscillator controls the ramp generator (pin 3 of IC200). When the oscillator resets the capacitors C205 and C206 are discharged. Charging current for C205/C206 is determined by the current to ground from Pin 13. This current is mirrored within the IC, and the output is obtained at Pin 3.

Positive feedback is applied to the junction of capacitors C205/6, via VR200, the 'Linearity' preset. The effect is to create an exponentially increasing voltage. Because of the effects of R211, positive feedback is reduced as the ramp voltage increases. The overall effect is to create an 'S' shaped ramp allowing correction for the symmetrical non-linearity of deflection. (This non-linearity is caused primarily by the large radius of curvature of the face of the CRT, relative to that of the deflection centre).

VERTICAL POWER AMPLIFIER

Pin 1 of IC200, is the 'Virtual Earth' Input of the power amplifier. Both DC and AC feedback is applied at this point. DC feedback, applied via R217/R219 and filtered by C208, is used to establish the DC operating point of the output amplifier. These components - in conjuction with R215 - set the DC gain relative to the reference voltage within the IC. A sample of the current in the vertical deflection yoke is developed across R223/216. The voltage across R223/R216 is fed- back to Pin 1, via R215. The current in R215 is made to balance the input current of R214, from the ramp generator output (Pin 4).

HF compensation for the amplifier is applied to Pin 2 of IC200. This comprises the network, R218 and C207. Stability is also maintained by the series combination of R220 and C209.

A parabolic voltage, output from IC160 pin 7 on the E-W Correction PCB, is used to provide East/West parabola correction for those models fitted with this extra PCB. Otherwise the parabola is taken from C210 via link LK235.

A pulsed waveform from the interface drives TR202 and TR203, via R228, R229 and TR204. These form the output stage of the vertical shift circuitry. Thus, the average voltage at the emitter junctions of TR202/3, depends on the 'mark-space ratio' of the pulsed waveform which, in turn, depends on the setting of the Vertical Shift pot. A DC current is thus superimposed on the frame current waveform, thereby producing the vertical shift.

FLYBACK GENERATION

IC200 also contains a flyback generator. The output available at Pin 7 of this device, in conjunction with C204 and D202, allows a doubling of the supply voltage to the output stage during the re-trace period. This considerably speeds up the vertical re-trace time.

BEAM CURRENT COMPENSATION

Transistor TR201 is biased to take a small current from Pin 13 of IC200, and so contributes to the ramp amplitude available on Pin 3 of this IC. Because R212 is connected to CRT beam current sampling components R289 and C237, the transistor bias is modified,

according to the beam current demands. Thus, as beam current increases, so TR202 conducts less current and this lowers the ramp amplitude. This results in a reduction in the vertical scan amplitude, compensating for the increased scan height due to the fall in the CRT High Voltage supply, due to beam current.

PARABOLIC (E-W) CORRECTION (Including optional E-W Correction PCB)

A parabolic voltage waveform, at field frequency, is required to provide E-W correction to the line ramps. Its amplitude is independent of field rate but proportional to the applied ramp amplitude.

The ramp generator output from IC200 pin 4 is at field frequency. It is decoupled by C275 to remove any video pickup and adjusted for linearity by the FIELD LIN control, VR200. The proper setting of this control leaves a small amount of non-linearity which is corrected later. Output from pin 4 is buffered by TR229, and linear correction is then provided by C160, C164, R162 and VR163(E-W LIN CORR).

From this network, a linear ramp voltage at field rate is applied to IC160 which produces a parabolic output at pin 7. The output amplitude is independent of field frequency but proportional to ramp amplitude.

This parabolic waveform is applied between base and emitter of TR207, modulating the current through it.

TR207 is in the tail of the long-tailed pair TR205, TR206. The base of TR205 is held to a 7.5V reference voltage by zener diode D203, while TR206 base is connected via a potential divider (R238, R239) to the B + voltage line. Variations in B + affect current sharing in the long-tailed pair, so that the output from TR206 follows B + voltage variations, but modified by the parabolic correction.

TR206 output is via VR201, the SET E-W preset, which, with R240 and R241, controls the gain of the following E-W correction amplifier IC201. From this amplifier, signal passes to the E-W driver, IC202, which operates as a Class D power amplifier, feeding via the E-W loading coil L200 to the diode modulator in the horizontal deflection stage. The coil passes the field frequency modulation forward, but impedes back feed of the high amplitude line frequency pulses in the horizontal deflection modulator.

HORIZONTAL DRIVE

Horizontal drive from IC206 is coupled to the Horizontal Drive Transistor, TR216. The horizontal drive stage is a standard flyback trnasformer coupled circuit, and operates from a nominal +32V rail. This rail is shared with the E/W Driver (IC202). This is a Class D power driver and the mode of operation allows energy recovery from the deflection circuit. The horizontal driver acts as the load on this supply rail so as to use the recovered energy, and thus aid the overall efficiency. R.C. Network, R330 and C258, shapes the base-drive waveform of the horizontal output transistor TR217. Circuitry, comprising D22, C257 and R329, reduces the overshoot on the collector of TR216. Diode D234 clamps any transient spikes to a safe level.

HORIZONTAL DEFLECTION

The horizontal deflection circuit is based on a diode- modulator circuit of the split capacitor type. Capacitors C262 and C263, comprise the two series tuning capacitors. Inductor L206 forms the E/W Bridge- Coil - or modulation inductor. Series diodes D225 and D226, together with D227, form respectively, the upper and lower steering diodes. E/W modulation is applied to the junction of capacitors C262 and C263, from IC202 (TDA4950) - via the E/W loading coil L200.

In the minimum width condition, the supply voltage to the horizontal output stage (B+) effectively appears across the deflection coils and the bridge coil in series. Thus, the deflection current is a minimum as shown by the equation:

$I = B+ . Tscan/Ly + Lm$

In the maximum width condition, when full modulation is applied, the circuit energy conditions dictate that the Bridge Coil is taken out of circuit by the Steering Diodes D225/6 and D227.

In this case:

$I = B+ . Tscan/Ly$

The action of the diode modulator allows dynamic modulation of the width between the two above limits, so that not only is static width adjustment possible, but also active E/W correction of the CRT pincushion distortion.

It is evident from the above equations that for operation over a wide range of horizontal scan periods, whilst maintaining constant deflection current in the horizontal deflection coils, the value of B+ required varies inversely proportional to Tscan. For this reason, the horizontal output stage is supplied from a special voltage regulator circuit, a description of which appears under **B+ Supply Regulator**, in the following description.

S correction for the upper band is applied by the parabolic voltage developed across C265 when operating above about 25kHz band. Below 25kHz,a switch circuit, TR218 and diode D229, allows C266 to be switched into circuit under a command from the Panoramic Sync circuit. This switch signal is coupled to transistor TR220. This drives the opto-coupler, IC208. IC208 provides galvanic isolation of this signal, so that the

Switch Driver, TR219, and Output Device, TR218 (which have a common mode 1100V retrace pulse present) can be effectively controlled. Thus, S correction is optimised in the upper and lower bands.

Horizontal raster shift current is provided in the conventional manner by the network L204, VR203, D230 and D231. This network is connected across the horizontal deflection coils.

HORIZONTAL OUTPUT - CIRCUIT PROTECTION

In the horizontal output circuitry, protection is provided against transient overcurrent and over voltage. In addition, X-Ray protection is also provided, together with short circuit protection for the flyback and supply regulator transistors.

In operation, in the event that the first level of protection fails to limit the EHT to an acceptable level, then the X-Ray protect function of IC206(TDA2595), is invoked. Overvoltage is sensed by peak rectification of flyback pulses derived from the Diode-Split Transformer T200, utilising components D219 and C252. Resistors R323 and R324 form a potential divider. The voltage, at the junction of these resistors, is fed via diode D218 to the 'Protect Input' on Pin 8 of IC206. When the voltage at this point exceeds its trip threshold then the TDA2595 inhibits its output. Consequently this shuts down the horizontal output - and thus the EHT supply.

The first mode of protection (which protects against a variety of potential faults) is the circuit built around IC207. This device is a dual comparator type LM393. The first comparator in the device acts as a threshold detector. This acts in such a manner that if the voltage across the sense resistor R342 (generated by the emitter current of TR217) exceeds the threshold voltage on Pin 3 of IC207, then the output on Pin 1 goes low. In so doing the second comparator in the device - which operates as a monostable - has its output (Pin 7) driven high for the time-out period. The protection system then attempts to turn-off the B+ regulator by controlling its inhibit line and changes the horizontal frequency to a high value for the duration of the monostable period.

Because the diode modulator produces a constant width retrace pulse, and a constant amplitude pulse for varying deflection currents, it follows that excessive EHT could be caused by varying current levels in TR217, depending on the modulation applied by the E/W drive circuit. To protect against this condition, the DC level at Pin 2 of IC207 is modified by an integrated version of the pulses present at the junction of capacitors C262 and C263. At minimum width, when maximum amplitude pulses are present at the capacitors' junction, then the current trip-level is at its most sensitive.

EHT is derived from the Diode-Split Transformer, T200. This transformer assembly incorporates a high voltage CR block, providing a resistive bleed across the EHT and a capacitive component to enhance smoothing. A degree of regulation is achieved by feedback applied to the B+ regulator of the reference retrace pulse from a winding connected to Pin 9 of the Diode-Split Flyback Transformer, T200.

B+ SUPPLY REGULATOR

To enable the monitor to operate at the variable and wide range of horizontal frequencies specified, and to be able to maintain a constant EHT and raster width, it is necessary to provide the correct B+ supply to the horizontal output stage for the particular operating frequency in use. The required relationship between frequency and B+ supply is approximately linear. To ensure that this is achieved, a Buck-regulator circuit is employed. This uses an NE555 Timer (IC204) operating as a monostable.

In operation, the period of the monostable is set to approximately 35us by components C230 and R265. Capacitor C226 couples horizontal drive pulses to IC204. C226 and R267/R268 differentiate these pulses. IC204 is triggered by the negative edge of the pulses, starting the time-out of the monostable. The output on Pin 3 of IC204 is driven high during the time-out period, turning On transistor TR208. When TR208 is On, TR209 is turned On together with the output transistor TR210. It is apparent from this cycle of events that the Off period of TR210 varies with the horizontal frequency of operation. Energy storage in L202 causes flyback action when TR210 turns Off, and drives the diode, D208 into conduction. Thus, for normal operation, there is continuous conduction in L202.

Transistors TR208 and TR209 have Baker clamp diodes fitted to minimise storage time delays at device turn- off (dead time). This minimises B+ Regulator overshoots and improves transient performance during lock-up.

For the Buck-Regulator, it can be shown that the equation following applies:

$$\mathbf{Vo} = Vin \times tp \times fh$$

where, **Vo** = Output voltage (B+)

Vin = Input Voltage

tp = Monostable pulse width

fH = Horizontal frequency

Therefore, for a fixed monostable pulse width tp, and input voltage Vin (+137V), Vo (the horizontal B+ supply) is proportional to the horizontal frequency.

Vo is proportional to fH (Vin, tp are constant).

In order to enhance the regulation of the EHT supply, feedback from the Diode-Split Flyback Transformer is applied to the regulator, so as to modify the monostable period and thus trim the B+ supply to the optimum value.

The horizontal trigger pulses at IC204 pin 2 are also fed via C281 to provide Reset at IC104 pin 4. R270 and R384 provide the DC voltage level, while C281, R270 and R384 differentiate the pulses. Reset is on the negative-going edge.

Since internal propagation delays within the NE555 are longer for the trigger function than for the reset function (approx 1us), it can be guaranteed that the reset operation will always occur just before the trigger for the next monostable time-out pulse. The effect is to restrict the maximum duty cycle of the NE555 to about 97%. This prevents double-pulsing, or half frequency operation, so that the correct operating mode of the B+ Regulator is maintained and EHT regulation at 36 kHz is improved.

The normal B+ Inhibit function is via transistor TR211, but is applied to the control pin, pin 5.

Peak rectification of the retrace pulse, available at Pin 9 of T200, is performed by D209. Capacitor C231 stores this voltage. A fraction of this voltage is buffered by one half of IC205. The reference voltage equates to that of the NE555 Timer, being two thirds of the NE555 Timer supply voltage. The error amplifier output, available at Pin 7, has a long-time-constant filter, R272 and C229, included to inhibit the tendency for short-term beam current demands, which cause apparant geometric distortion such as display width variations, etc.

When the monitor is unsynchronised, the voltage on the B+ Inhibit causes Transistor TR211 to conduct. This holds the NE555 Timer in reset mode, and so turns Off the B+ regulator. Capacitor C229 is discharged in this condition, and provides a slow-start function as the B+ supply is re-established, and filters feedback information from IC205, thus preventing beam current modulation on the B+ rail. Because no B+ supply is present when the monitor is out of sync, there is no horizontal scan or EHT generated.

NOTE It is not possible to obtain a blank raster with no horizontal sync pulse input applied to the monitor.

DIAGRAM TO BE ISSUED
AT A LATER DATE

DRIVE/DEFLECTION PCB CIRCUIT DIAGRAM (705)

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENTS LIST

COMPONENTS LIST

A Components List is given for one PCB, under its Assembly number. A list of differences is given for each variant of that PCB, under its own Assembly number.

The appropriate Assembly number for a PCB in a particular model may be found by reference to Table 1 in the Introduction to this Manual.

In the Components Lists, the following abbreviations are used.

Resistors	Capacitors
CC Carbon Composition	AE Aluminium Electrolytic
CF Carbon Film	C Ceramic
MF Metallised Film	CT Ceramic Tube
MO Metal Oxide	MP Metallised Polymer
TH Thermistor	PC Poly Carbonate
WW Wire Wound	PS Polystyrene
	T Tantalum

PTC Positive Temperature Coefficient.

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DRIVE DEFLECTION PCB AO 3638, AO 4012.

RESISTORS

Circuit Reference	Component Reference	Component Description
R200,259,294	RF472 DJO	470R 1/4W 5% CF
R201,203,206,228,232, 236,253,256,266-268,272 277,287,292,307,327,339 348,350,362	RF103 DJO	1KO 1/4W 5% CF
R204	RF395 DJO	390K 1/4W 5% CF
R205,311,352,357	RF333 DJO	3K3 1/4W 5% CF
R207,341	RF394 DJO	39K 1/4W 5% CF
R209,212,376	RF336 DJO	3M3 1/4W 5% CF
R210	RF685 DJO	680K 1/4W 5% CF
R211	RF686 DJO	6M8 1/4W 5% CF
R213,248	RF684 DJO	68K 1/4W 5% CF
R214	RF184 DJO	18K 1/4W 5% CF
R215,240	RF273 DJO	2K7 1/4W 5% CF
R216,223	RF150 DJO	1R5 1/4W 5% CF
R217,230,238,380	RF823 DJO	8K2 1/4W 5% CF
R218,250,381	RF225 DJO	220K 1/4W 5% CF

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENTS LIST

RESISTORS

Circuit Reference	Component Reference	Component Description
R219,275,296,304,309, 372,384	RF473 DJO	4K7 1/4W 5% CF
R220,237	RF220 DJO	2R2 1/4W 5% CF
R221	RW471 PK5	47R 4W 10%WW
R222	RM331 9JO	33R 1.6W 5% MF
R224	RF154 DJO	15K 1/4W 5% CF
R225,291	RF101 DJO	10R 1/4W 5% CF
R226,322	RF123 DJO	1K2 1/4W 5% CF
R227	RL470 GJO	4R7 1/2W 5% FF
R229,223,255	RF682 DJO	680R 1/4W 5% CF
R231,370	RF913 DJO	9K1 1/4W 5% CF
R234,235,260,273, 325,399	RF102 DJO	100R 1/4W 5% CF
R239,299	RF105 DJO	100K 1/4W 5% CF
R241,279	RF363 DJO	3K6 1/4W 5% CF
R242,252,254,276, 290,298,312,382	RF104 DJO	10K 1/4W 5% CF
R244,246	RF393 DJO	3K9 1/4W 5% CF
R245	RF825 DJO	820K 1/4W 5% CF
R247,285,310,320, 358	RF124 DJO	12K 1/4W 5% CF
R251	RF272 GJO	270R 1/2W 5% CF
R257,286	RF563 DJO	5K6 1/4W 5% CF
R258	RF100 GJO	1R0 1/2W 5% CF
R261,262	RF124 GJO	12K 1/2W 5% CF
R263,351	RF332 DJO	330R 1/4W 5% CF
R264,280,288,315	RF223 DJO	2K2 1/4W 5% CF
R265	RM563 DHO	5K62 1/4W 1% MF
R269,301	RF471 DJO	47R 1/4W 5% CF
R270,353,363,374	RF224 DJO	22K 1/4W 5% CF
R274	RF822 DJO	820R 1/4W 5% CF
R278	RF183 DJO	1K8 1/4W 5% CF

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENTS LIST

RESISTORS

Circuit Reference	Component Reference	Component Description
R282,297,328,375	RL101 GJO	10R 1/2W 5% FF
R284	RF824 DJO	82K 1/4W 5% CF
R289	RF334 DJO	33K 1/4W 5% CF
R293,295,321	RF274 DJO	27K 1/4W 5% CF
R300	RF182 DJO	180R 1/4W 5% CF
R303	RL101 DJO	10R 1/4W 5% MF
R308	RM114 DIO	11K 1/4W 2% MF
R313,318	RF683 DJO	6K8 1/4W 5% CF
R314	RF224 DJO	22K 1/4W 5% CF
R316,317	RF106 DJO	1M0 1/4W 5% CF
R323	RM564 DIO	56K 1/4W 2% MF
R324	RM104 DIO	10K 1/4W 2% MF
R329	RF183 GJO	1KS 1/2W 5% CF
R330	RW472 PK5	470R 4W 10%WW
R331-336	RF394 GJO	39K 1/2W 5% CF
R337	RW068 LK5	0R68 2W 10%WW
R338	RF271 GJO	27R 1/2W 5% CF
R340	RF225 GJO	220K 1/2W 5% CF
R342	RW010 LJS	OR1 2W 5% WW
R343	RW033 PK5	OR33 4W 10%WW
R344	RF681 DJO	68R 1/4W 5% CF
R345	RF222 DJO	220R 1/4W 5% CF
R346,364	RF104 GJO	10K 1/2W 5% CF
R347	R0103 LJO	1K0 2W 5% MO
R349	RL101 DJO	10R 1/4W 5% CF
R360	RM824 GIO	82K 1/2W 2% MF
R361	RF107 DJO	10M 1/4W 5% CF
R366	WL6300 TU1	Wire Link
R368	RF564 GJO	56K 1/2W 5% CF
R369	RF822 GJO	820R 1/2W 5% CF
R371	RF153 DJO	1K5 1/4W 5% CF
R373	CM474 NK6	47n 250V 10%MP

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENTS LIST

RESISTORS

Circuit Reference	Component Reference	Component Description
R382	RF335 DJO	330K 1/4W 5% CF
R385	RL220 DJO	2R2 1/4W 5% FF

CAPACITORS

C200	CM474 KK6	47n 63V MP
C201	CM105 NK7	100n 250V 10% MP
C202	CM105 NJ6	100n 250V 5% MP
C203	CA106 JL7	1n 50V 20% AE
C204,213,229,233	CA108 FM7	100u 25V AE
C205,206,224,236,242	CM105 NK6	100n 250V 10% MP
244,260,272,274		
C207	CK681 JJO	68p 50V CT
C208,214,216,218,232	CA107 JL7	10u 50V 20% AE
C209,225,237,238,239,	CM225 KK6	220p 100V MP
257,271		
C210,211	CA229 FL7	2200u 25V 20% AE
C212,268	CA227 FM7	22u 25u AE
C215,277	CA476 JL7	4u7 50V 20% AE
C217	CA478 HM7	470u 35V AE
C219,259	CK223 JKO	2n2 50V 10% CT
C220,243,246,251,252,	CM105 8K6	100n 63V 10% MP
254,264		
C221,222	CM685 8K6	680n 63V 10% MP
C223,261	CM104 TL6	10n 63V MP
C226	CK333 JKO	3n3 50V 10% CT
C227	CA477 NM7	47u 250V AE
C228	CA107 PL6	10u 350V 20% AE
C230,248	CP333 MHO	3n3 160V 1% P
C231	CA477 JL7H	47u 50V 20% AE
C234	CA226 8L7	2u2 63V 20% AE
C235	CA476 ML7	4u7 160V 20% AE
C240	CD561 RL6	56p 400V 20% C

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENTS LIST

CAPACITORS

Circuit Reference	Component Reference	Component Description
C241,245,249,258	CM224 RK6	22n 400V MP
C247	CA479 EL6	4700u 16V 20% AE
C250	CM475 8K6	470n 63V MP
C253	CD473 KK6	4n7 100V C
C255	CK102 JKO	100p 50V 10% CT
C256	CA478 IL7	470u 40V AE
C262	CL154 VJ6	15n 1KV 5% PP
C263	CL753 XJ6	7n5 1K5 PP
C265	CL106 NJ6	1u 250V 5% PP
C266	CL336 MJ6	3u3 160V 5% PP
C267,278,281	CD103 JK6	1n 50V 10% CD
C269	CD104 YP7	10n 2KV C
C270	CB336 KL6	3u3 100V 20% PC
C273	CM225 ML6	220n 160V 20% MP
C275	CD102 KK6	100p 100V 10% C
C280	CC223 KK6	2n2 100V C
C283	CD104 8K6	10n 63V 10% CD

DIODES

D201,205,215-218,220, 224,235,238,242	DS4148 UTD	1N4148
D202,207,230-233,245, 246	DP4007 UPO	1N4007
D203	DZ79750 FCO	Zener BZX79C7V5 5%
D204	DZ79221 FCO	Zener BZX79C22 5%
D206,221,228,286	DZ79560 FBO	Zener BZX79B5V6 2%
D208	DP0020 GJO	Rectifier 300V2A EGP20F
D209,213,214,219,222, 223,236,237	DF157 UUO	BA157
D210,211	DZ79121 FBO	Zener BZX79B12V 2%
D212	DZ79331 FBO	Zener BZX79B33V 2%

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENTS LIST

DIODES

Circuit Reference	Component Reference	Component Description
D225,226,229	DF0030 DJO	Fast Recovery RGP30K
D227	DP0862 CJO	Rectifier 600V5A GI826
D234	DZ85821 8CO	Zener BZX85C82V 5%
D244	DZ7933O FBO	Zener BZX79B3V3 2%

TRANSISTORS

TR2OO,205-207,211, 215,222,225	QS0337 UUO	BC337-RL1
TR201,204	QS4123 UUO	2N4123
TR202	QS0650 UFO	ZTX650
TR203	QS0750 KF6	ZTX750
TR208,221	QS0042 UUO	MPSA42
TR209	QS0757 UU5	ZTX757
TR210,218	QD0806 UUO	BU806
TR212,220	QS0307 UU5	BC307-5
TR216	QS0652 UUO	ZTX652
TR217	QQ3716 UWO	2SC3716
TR219,224	QS0092 UU5	MPSA92

INTEGRATED CIRCUITS

IC200	IL81760S4	TDA8176
IC201,205	IL35800U2	LM358
IC202	IL4950US2	TDA4950
IC203	IV0340UU3	LM340T12
IC204	IL0555PX2	NE555P Timer
IC206	IL2595OP2	TDA2595
IC207,209	IL0393NU2	LM393N
IC208	JL0025UU2	4N25 Opto-isolator

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENTS LIST

POTENTIOMETERS

Circuit Reference	Component Reference	Component Description
VR200	RQ225AL2	220K Preset
VR201	RQ224AL2	22K Preset
VR202	RQ472AL2	470R Preset
VR203	RS152PL2	150R Preset

INDUCTORS

L200	LO1018I01	E-W Loading Coil
L201	LW104UA7	10uH Choke
L202	L01344IO1	B + Regulator Choke
L203	LW104BK1	10uH 1205100K
L204	L00915I01	Horizontal Shift Coil
L205	L00940I01	Horizontal Linearity Coil
L206	L00939I01	E-W Bridge Coil
L207	LW105SK2	100uH Choke
LK244	LW104BK1	10uH Choke

TRANSFORMERS

T200	T00820I01	Feedback, Miorata MSU1FDR08
T201	T00914I01	Horizontal Drive

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENTS LIST

DRIVE DEFLECTION PCB AO 4195.

The Components List is as for AO 3638, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R308	RM1103DHO	11K 1/4W 1% MF
R380-383	Not fitted	

CAPACITORS

C229	CA477JL7H	47u 50V 20% AE
C283	Not fitted	

DIODES

D246	Not fitted	

TRANSISTORS

TR224	Not fitted	

INDUCTORS

L202	L00938I03	B+ Regulator Coil

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENTS LIST

DRIVE DEFLECTION PCB AO3979.

The Components List is as for AO 3638, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R204	RF275DJO	270K 1/4W 5% CF
R284	RF564DJO	56K 1/4W 5% CF
R373	RF105DJO	100K 1/4W 5% CF
R376	Not fitted	
R381	RF475DJO	470K 1/4W 5% CF

CAPACITORS

C200	CD4748P7	47n 63V C
C201	CM155KK6	150n 100V MP
C202	CM105NK6	100n 250V 10% MP
C208	CA227FM7	22u 25V AE
C241	CK104FL0	10n 25V 20% CT
C242	Not fitted	
C266	CL226MJ6	2u2 160V 5% PP

INDUCTORS

L202	LOO938I03	B+ Regulator Choke
L205	L01281I01	Line Linearity Coil

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENTS LIST

DRIVE DEFLECTION PCB AO 3181.

The Componenets List is as for AO 3638, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R204	RF275 DJO	270K 1/4W 5% CF
R217	RF104 DJO	10K 1/4W 5% CF
R221	RM681 9JO	68R 1.6W 5% MF
R222	RF681 GJO	68R 1/2W 5% CF
R224	RF394 DJO	39K 1/4W 5% CF
R225	RF151 DJO	15R 1/4W 5% CF
R237	RF100 DJO	1R0 1/4W 5% CF
R245	RF915 DJO	910K 1/4W 5% CF
R265	RM413 DHO	4K12 1/4W 1% MF
R270	RF102 DJO	100R 1/4W 5% CF
R273	RF152 DJO	150R 1/4W 5% CF
R281	RF222 DJO	220R 1/4W 5% CF
R284	RF624 DJO	62K 1/4W 5% CF
R286 in series	(RF563 DJO	5K6 1/4W 5% CF
	(DZ79560 FBO	Zener BZX79B5V6 2%
R299	RF102 DJO	100R 1/4W 5% CF
R303	RF683 DJO	6K8 1/4W 5% CF
R304	RF333 DJO	3K3 1/4W 5% CF
R305	RF473 DJO	4K7 1/4W 5% CF
R306	RF183 DJO	1K8 1/4W 5% CF
R310	RF333 DJO	3K3 1/4W 5% CF
R319	RF683 DJO	6K8 1/4W 5% CF
R324	RF104 DJO	10K 1/4W 5% CF
R325 in series	(RF102 DJO	100R 1/4W 5% CF
	(LW105 SK2	100uH
R328	Not fitted	
R343	RW033 MKO	2.5W WW
R360	RF684 DJO	68K 1/4W 5% CF
R361 in parallel	(RF107 DJO	10M 1/4W 5% CF
	(DP4007 UUO	1N4007 diode

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENT LIST

RESISTORS

Circuit Reference	Component Reference	Component Description
R366	Not fitted	
R368	Not fitted	
R373	RF105 DJO	100K 1/4W 5% CF
R374	Not fitted	
R375	Not fitted	
R376	Not fitted	
R380,381,383,384	Not fitted	
R399 in series	(RF102 DJO	100R 1/4W 5% CF
	(LW105 SK2	100uH

CAPACITORS

C200	Not fitted	
C201	CM155KK6	100n 100V MP
C202	CM105 NK6	100n 250V 10% MP
C204	CA108 FL7H	100u 25V 20% AE
C210	CA109 JL7	1000u 50V 20% AE
C213	CA108 FL7H	100u 25V 20% AE
C226	CK103 JKO	1n 50V 10% CT
C229	CA108 FL7H	100u 25V 20% AE
C231	CA107 JL7	10u 50V 20% AE
C233	CA108 FL7H	100u 25V 20% AE
C240	CK271 JJO	27p 50V CT
C243	CM475 8K6	470n 63V 10% MP
C244	CM225 KK6	220p 100V MP
C246	CM105 NK6	100n 250V 10% MP
C247	CA478 FM7	470u 25V AE
C251	CM105 NK6	100n 250V 10% MP
C252	CM105 NK6	100n 250V 10% MP
C254	CM105 NK6	100n 250V 10% MP
C263	CL683 XJ9	6n8 1500V 10% MP
C264	CM105 NK6	100n 250V 10% MP
C266	CL226 MJ6	2n2 160V 5% PP
C275	Not fitted	

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENTS LIST

CAPACITORS

Circuit Reference	Component Reference	Component Description
C277	Not fitted	
C278	Not fitted	
C279	CJ105 JL6	100n 50V 20% AE
C280-283	Not fitted	

DIODES

D206	DZ79560 FBO	Zener BZX79B5V6 2%
in series with	DZ79330FBO	Zener BZX79B3V3 2%
D208	DF0015 DJO	Fast recovery diode
	RGPI5K	
D227	DF0030 DJO	Fast recovery diode
	RGP30K	
D238	Not fitted	
D239	DS4148 UTO	1N4148
D240-244	Not fitted	

TRANSISTORS

R264 (in series) cathode to TR208(b)	DS4148 UTO	1N4148
R266/264 cathode to TR208(c)	DF0157 UDO	BA157
R286 (in series)	DZ79560 FBO	Zener BZX79B5V6 2%
R361 (cathode to LK211)	DP4007 UPO	1N4007
TR213	QS4123 UVO	2N4123
TR214	QS4123 UUO	2N4123
TR224	Not fitted	

INTEGRATED CIRCUITS

IC208,209	Not fitted

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENTS LIST

INDUCTORS

Circuit Reference	Component Reference	Component Description
L202	L00938I03	B + Regulator Choke
L205	LO1264I01	Linearity Coil
L206	L00939I02	E-W Bridge Coil
- in series with R325	LW105SK2	100uH Choke
LK244	LW104SK1	10uH Choke

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENTS LIST

DRIVE DEFLECTION PCB AO4206.

The Componenets List is as for AO 3638, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R204	RF275DJO	270K 1/4W 5% CF
R212	RF476DJO	4M7 1/4W 5% CF
R221	RM6819JO	68R 1.6W 5% MF
R243	RM124DHO	12K 1/4W 1% MF
R245	FR186DJO	1M8 1/4W 5% CF
R247, 298, 376, 382	Not Fitted	
R281, 345	RF222DJO	220R 1/4W 5% CF
R360, 381	Not Fitted	
R373	RF105DJO	100K 1/4W 5% CF

CAPACITORS

C220	Not Fitted	
C249	CM104TJ6	10n 630V 5% MP

TRANSISTORS

TR229	QS0307UU5	BC307-5

SERIES 7 MK2: DRIVE/DEFLECTION PCB: COMPONENTS LIST

DRIVE DEFLECTION PCB AO4233.

The Componenets List is as for AO 3638, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R204	R275DJO	270K 1/4W 5% CF
R212	RF476DJO	4M7 1/4W 5% CF
R217, 360, 376	Not Fitted	
R221	RM6819JO	68R 1.6W 5% MF
R222	RM681GJO	68R 1/2W 5% CF
R245	RF186DJO	1M8 1/4W 5% CF
R281, 345	RF222DJO	220R 1/4W 5% CF
R284	RF564GJO	56K 1/2W 5% CF
R373	RF105DJO	100K 1/4W 5% CF
R381	RF475DJO	470K 1/4W 5% CF

CAPACITORS

C249	CM104TJ6	10n 630V 5% MP

SERIES 7 MK 2: E-W CORRECTION PCB

GENERAL

This is a small PCB which plugs into the Drive/Deflection PCB. Its circuit and its components list are included in the Drive/Deflection PCB for the models which use it. See Table 1 in the Introduction to this manual for the relevant circuit and layout numbers, and the Drive/Deflection PCB Section for the circuit description and components list.

CIRCUIT DESCRIPTION

The circuit description is included in its context in the circuit description for the Drive/Deflection PCB.

SERIES 7 MK2: INTERFACE PCB

GENERAL

This section gives the following information on the Interface PCB for each Series 7 Mk 2 model.

Circuit Diagram Waveform Diagram

Layout Diagram components List

These are identified by drawing numbers.

Table 1 in the Introduction to this manual relates Model numbers to these drawing numbers, so that the drawings appropriate to a particular model may be selected.

Two circuit descriptions are given.

(1) The Basic Model version, for circuit GO 1151.

This description is appropriate for other Interface PCB circuits, in models which do not have a Differential Input PCB.

(2) The Dealing Room Model version, for circuit GO 1456. This is appropriate for those models which do have a Differential Input PCB.

INTERFACE PCB (BASIC MODEL) Circuit No. GO 1151

GENERAL CIRCUIT FUNCTIONS

The Series 7 Mk2 Interface PCB is a general purpose interface for both TTL and Analogue RGB inputs. The TTL input is compatible with the IBM Enhanced Graphics Adaptor. The analogue input is compatible with the IBM Professional Graphics system but can also be configured to accept separate vertical synchronising pulses on the Mode line of the IBM system.

The Interface accepts either polarity of synchronising pulse, normalising to negative-going horizontal sync pulses and positive-going vertical sync pulses. An arbitration circuit determines the source of the sync pulses, so that separate TTL sync inputs take priority over composites. For the analogue input, the horizontal TTL sync input overrides the sync-on-green source.

The interface allows more than one signal source to be connected to the monitor at a time. The operator can select between the Analogue and TTL inputs using the VIDEO SOURCE SELECT switch. The selected video and sync signals are routed onto the video and sync buses and a group of picture preset controls are connected to the four monitor control lines.

The four control lines have the following functions:

a) Vertical height

b) Horizontal amplitude (Width)

c) Vertical Position (Shift)

d) Horizontal Position (Phase)

The Interface PCB has an analogue signal processor which handles all video signals and provides the functions of DC contrast, black-level clamping, and retrace blanking. Also provided is a vertical shift generator, and an automatic vertical height compensator, situated between the controls and the control lines of the deflection assembly.

The Interface PCB operates mainly from +12V, with some TTL level functions operating from a +5V supply derived from the 6.3V CRT heater supply. The +12V is derived from the monitor +19V or +24V supply and is controlled by its own Three Terminal Regulator.

The TTL input is switchable to 4-bit or 6-bit TTL operation or to AUTO (EGA) Mode by a three-position slide-switch.

TTL INPUT PROCESSOR

A PCB-mounted 9 pin D type connector, PL501, routes the input signal to a single in-line array of 1kohm terminating resistors, and hence to the signal processing stages. The slide-switch, S701, selects the TTL input function: 4 bit, 6 bit or AUTO(EGA).

TTL SELECT SWITCHING.

With the TTL SELECT switch (S701) set to 4 bit, a low (0V) is fed out from S701. With the switch at 6 BIT, a high (+5V) is fed out. If the switch is at AUTO, an automatic selection of high or low, is produced, as follows.

TTL SELECT, AUTO.

Negative-going vertical sync corresponds, conventionally , with a 6 bit TTL code, and positive-going vertical sync with a 4 bit code. Vertical sync is fed in at PL524/9 (the TTL input plug), integrated by R511 and C503, and fed to S701. This is fed through the switch when AUTO is selected, providing a low (from positive-going sync) or a high (from negative-going sync).

A high at S701 output is used to set up the PCB for a 6 bit TTL input, or a low to do so for 4 bit TTL input.

4 BIT/6 BIT DECODE.

In 6 bit code, three lines carry the RGB signals, and three more carry the low intensity r g b signals. In 4 bit code, the 'low intensity green' line carries the Intensity (I) signal and is added to the R G B lines by IC501.

Switch IC501 gates the required low intensity signals through to the buffer amplifier IC503, as follows. A high (indicating 6 bit code) out of S701 opens the r and b gates in IC503, while its inversion via TR501 closes the two gates for the Intensity signal (I). Thus RGB r g b are all fed to IC503. A low (indicating 4 bit code) out of S701 closes the r and b gates in IC503, while its inverse opens the two gates for the Intensity signal I. Thus, RGB are all fed to IC503 and the one Intensity signal, I, is fed on the three lines r g b.

Presets VR531, VR528 and VR533 are the RGB gain controls for the TTL channel.

TTL ENABLE. (Fig 1, Analogue Enable- TTL Enable)

To activate the TTL channel, a TTL Enable signal is fed via PL517/3 from the VIDEO SOURCE SELECT switch.

Resistors R575 and R539 feed Enable to the TTL switches, IC504 and IC505. So that IC504 or IC505 is selected, its associated transistor TR502 or TR503 must be non-conducting. TR503 base receives the voltage from switch S701, and TR502 base receives the inverse voltage from TR501 collector. Thus, with a logic high from S701, TR503 is turned On, disabling IC505, while TR502 is made non-conductive, enabling IC504. IC504 connects the four picture presets VR571, VR572, VR573, VR574 to the control bus. This bank of presets forms the 6-bit TTL set-up controls.

If a logic low is present at the MODE SELECTOR switch, then IC504 is disabled and IC505 enabled. IC505 connects the 4-bit TTL Picture Geometry set-up controls to the controls bus.

The video D/A (IC503 and associated resistors) produces a pseudo-analogue video signal which incorporates mixed blanking . Mixed blanking is introduced via the enable lines of IC503, and the video signals are passed onto the video switches. The video switches are enabled by the Enable TTL Lines described previously. Each channel of the video switch comprises two physically separated parts. The first section is specific to the particular input, i.e. TTL, Analogue, etc. The second section is common to the Video signal - irrespective of its source. The switch circuit is designed around an emitter-coupled pair of PNP transistors, with a dual- diode switch circuit, interposed between the two devices.

Consider the switch formed around TR508 and TR530: Transistors TR508 and TR530 have their base-bias derived from a reference voltage source (D527 and TR528) of about 6V, and this ensures adequate collector current sharing between the two devices. In the enabled state, TR510 is not conductive and so D506 and D507 are forward biased and have virtually no influence on the operation of the emitter-coupled pair. When the stage is disabled, TR510 turns on and grounds the junction of the two diodes. Resistors R552 and R683 ensure that the two diodes are held in reverse bias, effectively isolating the video signal from TR530. The cathode of D507 is the common or bus line for the other video sources for this single colour channel. A gain of around 1.5 times is achieved in this stage.

Synchronising pulses from the TTL source are coupled to the sync bus lines by the open collector gates IC506. These NAND function gates have one input from the sync source and the other input from the attenuated 12V enable signal. The output is then non-conductive, unless enabled - when sync is imposed on the output bus line, all other circuits feeding the bus lines then being high impedance.

ANALOGUE INPUT PROCESSOR

The input signal is fed from PL502 to an input termination network where the gain for each colour is set. The signal is then passed onto the analogue side of the VIDEO SOURCE SELECT switch. The switch operates in the same way as described for the TTL channel.

If horizontal or composite sync is applied, then this signal is fed onto the sync bus via IC509. If no separate TTL sync is applied, then the monitor will default to sync-on-green when the analogue channel is selected.

The analogue input stage has two modes of operation, the first being similar to PGA, in that the height can be switched by an external line (Mode), the other being standard. Selection of the Mode of Operation is made by the position of Test Link TL581. This routes the signal on Pin 5 of PL502 into the mode circuit which applies a voltage to the height control line, set by VR774, or to the vertical sync bus, via IC509.

When the Analogue channel is enabled, IC507 is enabled, thus connecting the Analogue Presets onto the control line bus.

SIGNAL PROCESSING CIRCUIT

The signal processing circuit is similar in operation on Red, Green and Blue Channels. For the purpose of this description, the Red channel only is considered.

The output signal from the switch can be found on resistor R705. This signal is passed onto the base of the control transistor for the long-tail pair in IC514. The voltages on the bases of the long-tail pair are varied with respect to each other by the Contrast control. This controls the sharing of the current between the transistors of each pair.

Hence the output signal, which appears inverted on R717, can be adjusted by the Contrast control. This signal is then amplified and buffered before being passed through the clamping capacitor, C570. Clamping is performed by an FET, TR544 (one per channel). Once clamped, the signal is buffered before blanking is applied via D536 and TR524. The fully processed signal is then passed onto the Tube Base PCB Board Assembly via the Output Transistor, TR537 and connector PL507.

In order to protect the picture tube, a beam limiting signal is applied to one end of the Contrast pot. Thus, as beam current is increased over the threshold level, the contrast voltage is adjusted accordingly to reduce the signal level at R717, and hence reduce the beam current.

CLAMPING CIRCUIT

To allow the monitor to work with all known timings, it is necessary to reduce the width of the clamp-pulse produced by the horizontal processing IC. This is done using a monostable, IC512. The output of the monostable is passed through C591 to the gates of the individual clamping FETs. The sources of the FETs are connected to a Zener diode, D528, which produces the correct black-level for the Tube Base PCB Video Amplifier.

BLANKING CIRCUIT

The signal is blanked during horizontal retrace, vertical retrace, and when the monitor is out-of-lock. To do this, it is necessary to mix the three relevant signals at the base of TR524, the blanking transistor. Diodes D526 and D525 provide an anti-saturation clamp for TR524, thus ensuring fast turn-on and turn-off. Turning on TR524 effectively grounds the bases of the output transistors through diodes D534, D535, and D536. This produces a negative-going pulse on the signal, and hence blanking.

SYNC PROCESSING

Sync processing can be split into two sections: horizontal or composite, and vertical.

VERTICAL SYNC PROCESSING.

If sync is present, then it is first polarised by IC508/11 to give a positive-going pulse, irrespective of the polarity of the input. The output is then passed onto transistor TR523, which acts as a buffer. It is also passed onto a peak-detecting circuit, which turns On transistor TR522 if sync is present, thus suppressing the sync input from the horizontal processing IC(IC206). If sync is not present, the output of IC508/11 is low and the circuit defaults to passing the sync from the horizontal processing IC through TR523 to the vertical deflection circuit.

HORIZONTAL SYNC PROCESSING.

The horizontal circuit works in a similar manner to the vertical circuit: if there is no TTL sync, the circuit defaults to passing the signal from the green channel to the sync input of the horizontal processing IC. If TTL sync is present, it is polarised to be negative-going by two sections of IC508. The output is DC-restored by D530, and is then passed onto the horizontal processor via a buffer, TR520. At the same time, TR518 is turned On thus suppressing the signal from the green channel.

HEIGHT COMPENSATION CIRCUIT

This circuit produces a constant height raster over a vertical frequency range of 40Hz to 100Hz. The circuit uses a monostable which produces a pulse of fixed duration at the current vertical rate. The amplitude of the pulse is set by the Height Control controlling the supply voltage to the monostable. The output of the monostable is smoothed by components R661 and C541,C539. The resulting DC voltage is used to control the height via a current-mirror produced by IC510.

VERTICAL SHIFT CIRCUIT

This circuit is centred around a comparator, one input of which is set to a DC level determined by the vertical shift control line. The other has a ramp which is produced by C544, D524, TR525, R667, R670 and is generated at the horizontal-rate frequency. Thus, the output of the comparator will be a pulsed waveform, whose mark-space ratio is determined by the setting of the vertical shift control line. This output is passed to the Vertical Output circuit on the Main Drive/Deflection PCB. There it is amplified to produce a direct current which controls the position of the raster.

ANALOGUE ENABLE - TTL ENABLE

Two circuit conditions can exist:

1. Through path for Analogue RGB, which is achieved by the signals Analogue Enable, and /TTL Enable. These are both from PL517.

Analogue Enable

(a) Connects the analogue presets of Height, Vertical Shift, H Phase and width by setting switches in IC507.

(b) Enables Composite Sync in at PL502/5 which is then routed to the H.Sync bus (PL517/9). It is then normalised to positive sync pulses (IC508/3) and then inverted to provide the H Sync/Video output at PL510/5 to the Drive/Deflection PCB (PL202).

(c) Enables V Sync in at PL502/6 which is then routed to the V.Sync bus (PL517/8). It is also normalised to positive pulses in IC508/11. These, if present, take priority over V Sync from PL510/4 (from sync processor IC206 on the Drive/Deflection PCB) in providing the V Sync output.

/TTL Enable

(a) Switches transistors TR507, TR505 and TR510On, to disconnect the TTL R,G,B signals via diodes D504, D502,D506.

2. Through path for TTL, which is achieved by the signals /Analogue Enable, and TTL Enable. In this case, a selection is made between 4 bit and 6 bit coded TTL by an input from S701.

TTL Enable

(a) Connects either the 4 bit or the 6 bit TTL presets by switches in either IC505 or IC504.

(b) Enables H Sync in at PL501/8 which is routed via IC506/6 to the H.Sync bus (PL517/9) . The signal is also normalised to positive sync pulses in IC508/3 and then inverted to provide the H Sync/Video output at PL510.

(c) Enables V Sync in at PL501/9 which is routed via IC506/3 to the V.Sync bus (PL517/8). V Sync is also normalised to positive pulses in IC508/11. These, if present, take priority over V Sync from PL510/4 (from sync processor IC206 on the Drive/Deflection PCB) in providing the V Sync output.

/Analogue Enable

(a) Switches transistors TR514, TR515 and TR516 on, to disconnect the Analogue RGB signals via diodes D510, D512, D514.

INTERFACE PCB (DEALING ROOM) Assembly AO 3858 Circuit GO 1456

GENERAL CIRCUIT FUNCTIONS

This Interface PCB receives inputs from the PS2/Differential Input PCB, and these inputs have already received a certain amount of signal processing. The Interface PCB provides an interface for both TTL and Analogue RGB inputs. The standard TTL input is compatible with the IBM Enhanced Graphics Adaptor (EGA).

The Interface accepts either polarity of synchronising pulse, normalising to negative-going horizontal sync pulses and positive-going vertical sync pulses.

The interface allows more than one signal source to be connected to the monitor at a time. Selection between the Analogue and TTL inputs is automatic. The selected video and sync signals are routed onto the video and sync buses and a dedicated group of picture preset controls are connected to the four monitor control lines.

The four control lines have the following functions:

a) Vertical height

b) Horizontal amplitude (Width)

c) Vertical Position (Shift)

d) Horizontal Position (Phase)

The Interface PCB has an analogue signal processor which handles all video signals and provides the functions of DC contrast, black-level clamping, and retrace blanking. Also provided is a vertical shift generator, and an automatic vertical height compensator, situated between the controls and the control lines of the deflection assembly.

The Interface PCB operates mainly from +12V, with some TTL level functions operating from a +5V supply derived from the 6.3V CRT heater supply. The +12V is derived from the monitor +19V supply and is controlled by its own Three Terminal Regulator.

The TTL input is switchable to 3 bit, 4 bit or 6 bit TTL operation or to AUTO (EGA) Mode by a four-position slide-switch on the PS2/Differential Input PCB.

TTL INPUT PROCESSOR

TTL SELECT SWITCHING.

On the PS2/Differential Input PCB, 3 bit TTL is converted to 6 bit code, so at the Interface PCB, the choice is between 4 bit and 6 bit TTL data. With the TTL SELECT switch set to 4 bit, a low (0V) is fed into the PCB at PL523/2: with the switch at 3 BIT or 6 BIT a high (+5V) is fed in on the same pin. If the switch is at AUTO, PL523 pins 1 and 2 are linked, producing an automatic selection of high or low, as follows.

TTL SELECT, AUTO.

Negative-going vertical sync corresponds, conventionally , with a 6 bit TTL code, and positive-going vertical sync with a 4 bit code. Vertical sync is fed in at PL524 (the TTL input plug), integrated by R511 and C503, and fed to PL523 pin1. This is linked to pin2 when AUTO is selected, providing a low (from positive-going sync) or a high (from negative-going sync).

A high at PL523 is used to set up the PCB for a 6 bit TTL input, or a low to do so for 4 bit TTL input.

4 BIT/6 BIT DECODE.

In 6 bit code, three lines carry the RGB signals, and three more carry the low intensity r g b signals. In 4 bit code, the low intensity green line carries the Intensity (I) signal and is connected to the r g b lines.

Switch IC501 gates the required low intensity signals through to the buffer amplifier IC503, as follows. A high (indicating 6 bit code) at PL523/2 opens the r and b gates in IC503, while its inversion via TR501 closes the two gates for the Intensity signal (I). Thus RGB r g b are all fed to IC503. A low (indicating 4 bit code) at PL523/2 closes the r and b gates in IC503, while its inverse opens the two gates for the Intensity signal I. Thus, RGB are fed to IC503 and the Intensity signal, I, is fed on the three lines r g b.

Presets VR531, VR528 and VR533 are the RGB gain controls for the TTL channel.

TTL ENABLE.

To activate the TTL channel, a TTL Enable signal is fed to PL517/3 from the PS2/Differential Input PCB. Resistors R575 and R539 feed Enable to the TTL switches, IC504 and IC505. In order that IC504 or IC505 is selected, its associated transistor TR502 or TR503 must be non-conducting. TR503 base is fed with the voltage from the MODE SELECTOR switch, and TR502 base is fed with the inverse voltage from TR501 collector. Thus, in the case of a logic high from the MODE SELECTOR Switch, TR503 is turned On, disabling IC505 while TR502 is made non-conductive, enabling IC504. IC504 thus connects the four picture presets VR571, VR572, VR573, VR574 to the control bus. This bank of presets forms the 6-bit TTL set-up controls.

If a logic low were present at the MODE SELECTOR switch, then IC504 would be disabled and IC505 enabled. IC505 connects the 4-bit TTL Picture Geometry set-up controls to the controls bus.

The video D/A produces a pseudo-analogue video signal which incorporates mixed blanking . Mixed blanking is introduced via the enable lines of IC503, and is passed onto the video switches. The video switches are enabled by the Enable TTL Lines previously described. Each channel of the video switch comprises two physically separated parts. The first section is specific to the particular input, i.e. TTL, Analogue, etc. The second section is common to the Video signal - irrespective of its source. The switch circuit is designed around an emitter-coupled pair of PNP transistors, with a dual-diode switch circuit, interposed between the two devices.

Consider the switch formed around TR508 and TR530: Transistors TR508 and TR530 have their base-bias derived from a reference voltage source (D527 and TR528) of about 6V, and this ensures adequate collector current sharing between the two devices. In the enabled state, TR510 is not conductive and so D506 and D507 are forward biased and have virtually no influence on the operation of the emitter-coupled pair. When the stage is disabled, TR510 turns on and grounds the junction of the two diodes. Resistors R552 and R683 ensure that two diodes are held in reverse bias, effectively isolating the video signal from TR530. The cathode of D507 is the common or bus line for the other video sources for this single colour channel. A gain of around 1.5 times is achieved in this stage.

Synchronising pulses from the TTL source are coupled to the sync bus lines by the open collector gates IC506. These NAND function gates have one input from the sync source and the other input from the attenuated 12V enable signal. The output is then non-conductive, unless enabled - when sync is imposed on the output bus line, all other circuits feeding the bus lines then being high impedance.

ANALOGUE INPUT PROCESSOR

The input signal is fed from PL502 to a termination network where the gain for each colour is set.

If horizontal or composite sync is applied, then this signal is fed onto the sync bus via IC509.

When Analogue is enabled, IC507 is enabled, thus connecting the Analogue Presets onto the control bus.

SIGNAL PROCESSING CIRCUIT

The signal processing circuit is similar in operation on Red, Green and Blue Channels. For the purpose of this description, the Red channel only is considered.

The output signal from the switch can be found on resistor R705. This signal is passed onto the base of the control transistor for the long-tail pair in IC514.

The voltages on the bases of the long-tail pair are varied with respect to each other by the Contrast control. This controls the sharing of the current between the transistors of each pair. Hence the output signal, which appears inverted on R717, can be adjusted by the Contrast control. This signal is then amplified and buffered before being passed through the clamping capacitor, C570. Clamping is performed by an FET, TR544 (one per channel). Once clamped, the signal is buffered before blanking is applied via D536 and TR524. The fully processed signal is then passed onto the Tube Base PCB Board Assembly via the Output Transistor, TR537 and connector PL507.

In order to protect the picture tube, a beam limiting signal is applied to one end of the Contrast pot. Thus, as beam current is increased over the threshold level, the contrast voltage is adjusted accordingly to reduce the signal level at R717, and hence reduce the beam current.

CLAMPING CIRCUIT

To allow the monitor to work with known TTL timings, it is necessary to reduce the width of the clamp pulse produced by the horizontal processing IC. This is done using a monostable, IC512. The analogue clamp pulses generated by the PS2/Diff Input Panel are also routed through this monostable. The output of the monostable is passed through C591 to the gates of the individual clamping FETs. The sources of the FETs are connected to a Zener diode, D528, which produces the correct black- level for the Tube Base PCB Video Amplifier.

BLANKING CIRCUIT

The signal is blanked during horizontal retrace, vertical retrace, and when the monitor is out-of-lock. To do this, it is necessary to mix the three relevant signals at the base of TR524, the blanking transistor. Diodes D526 and D525 provide an anti-saturation clamp for TR524, thus ensuring fast turn-on and turn-off. Turning on TR524 effectively grounds the bases of the output transistors through diodes D534, D535, and D536. This produces a negative-going pulse on the signal, and hence blanking.

SYNC PROCESSING

Sync processing can be split into two sections: horizontal or composite, and vertical.

VERTICAL SYNC PROCESSING.

If sync is present, it is first normalised by IC508/11 to give a positive-going pulse, irrespective of the polarity of the input. The output is then passed onto transistor TR523, which acts as a buffer. It is also passed onto a peak-detecting circuit, which turns On transistor TR522 if sync is present, thus suppressing the sync input from the horizontal processing IC(IC206). If sync is not present, the output at IC508/11 is low and the circuit defaults to passing the sync from the horizontal processor IC through TR523 to the vertical deflection circuit.

HORIZONTAL SYNC PROCESSING

The horizontal sync is normalised by IC508/3 and IC508/8 to give a negative-going pulse, irrespective of the polarity of the input. The pulse is buffered by TR520 and fed out at PL510/5 to the Drive/Deflection PCB.

HEIGHT COMPENSATION CIRCUIT

This circuit produces a constant height raster over a vertical frequency range of 40Hz to 100Hz. The circuit uses a monostable which produces a pulse of fixed duration at the current vertical rate. The amplitude of the pulse is set by the Height Control controlling the supply voltage to the monostable. The output of the monostable is smoothed by components R661 and C541,C539. The resulting DC voltage is used to control the height via a current-mirror produced by IC510.

VERTICAL SHIFT CIRCUIT

This circuit is centred around a comparator, one input of which is set to a DC level determined by the vertical shift control line. The other has a ramp which is produced by C544, D524, TR525, R667, R670 and is generated at the horizontal-rate frequency. Thus, the output of the comparator will be a pulsed waveform, whose mark-space ratio is determined by the setting of the vertical shift control line. This output is passed to the Vertical Output circuit on the Main Drive/Deflection PCB. There it is amplified to produce a direct current which controls the position of the raster.

ANALOGUE ENABLE- TTL ENABLE

Three circuit conditions can exist:

1. Through path for Analogue RGB, which is achieved bythe signals Analogue Enable, and /TTL Enable. These are both from the Differential Input PCB.

Analogue Enable

(a) Connects the analogue presets of Height, Vertical Shift, H Phase and width by setting switches in IC507.

(b) Enables Composite Sync in from the Differential Input PCB which is then routed to the H.Sync bus (PL517/9). It is then normalised to positive sync pulses (IC508/3) and then inverted to provide the H Sync/Video output at PL510/5 to the Drive/Deflection PCB (PL202).

(c) Enables V Sync from the Differential Input PCB which is then routed to the V.Sync bus (PL517/8). It is also normalised to positive pulses in IC508/11. These, if present, take priority over V Sync from PL510/4 (from sync processor IC206 on the Drive/Deflection PCB) in providing the V Sync output.

/TTL Enable

(a) Switches transistors TR507, TR505 and TR510On, to disconnect the TTL R,G,B signals via diodes D504, D502, D506.

2. Through path for TTL. This is achieved by the signals /Analogue Enable, and TTL Enable. A selection is made between 4 bit and 6 bit coded TTL by an input at PL523/2 from PL402 on the Differential Input PCB. This, in turn, is determined by the setting of the Auto / 6 Bit / 4 Bit / 3 Bit slide switch.

TTL Enable

(a) Connects either the 4 bit or the 6 bit TTL presets by switches in either IC505 or IC504.

(b) Enables H Sync in from the Differential Input PCB which is then routed via IC506/6 to the H.Sync bus (PL517/9). The signal is also normalised to positive sync pulses in IC508/11 and then inverted to provide the H Sync/Video output at PL510.

(c) Enables V Sync in from the Differential Input PCB which is routed via IC506/3 to the V.Sync bus (PL517/8). V Sync is also normalised to positive pulses in IC508/11. These, if present, take priority over V Sync from PL510/4 (from the sync processor IC206 on the Drive/Deflection PCB) in providing the V Sync output.

/Analogue Enable

(a) Switches transistors TR514, TR515 and TR516on, to disconnect the Analogue RGB signals via diodes D510, D512, D514.

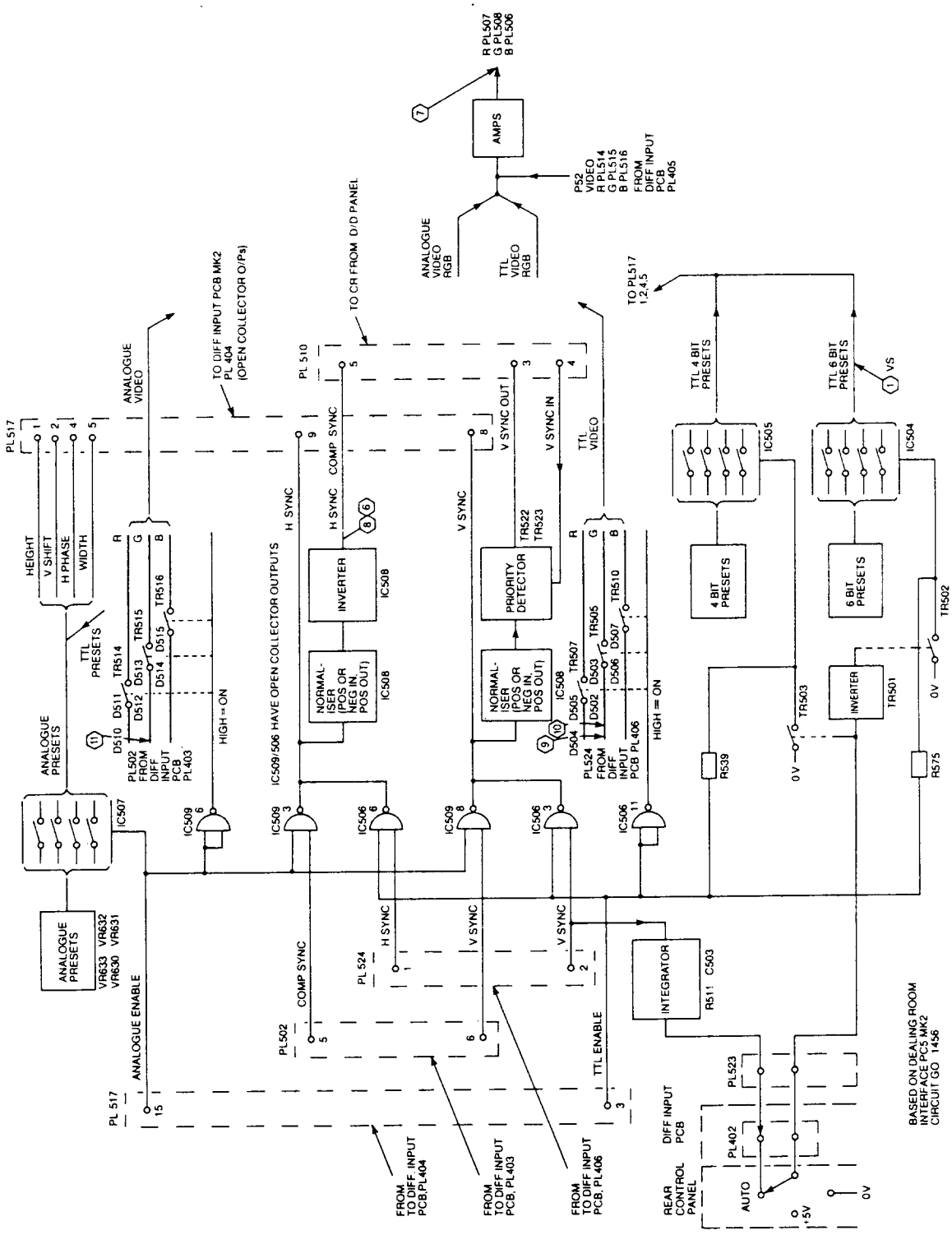
3. Through path for PS2 RGB. With the TTL/PS2 switch set to PS2, the signals from the Differential Input PCB are /Analogue Enable and /TTL Enable.

/Analogue Enable switches transistors TR514, TR515 and TR516 on, to disconnect the Analogue RGB signals via diodes D510, D512, D514.

/TTL Enable switches transistors TR507, TR505 and TR510 on, to disconnect the TTL RGB signals via diodes D504, D502, D506.

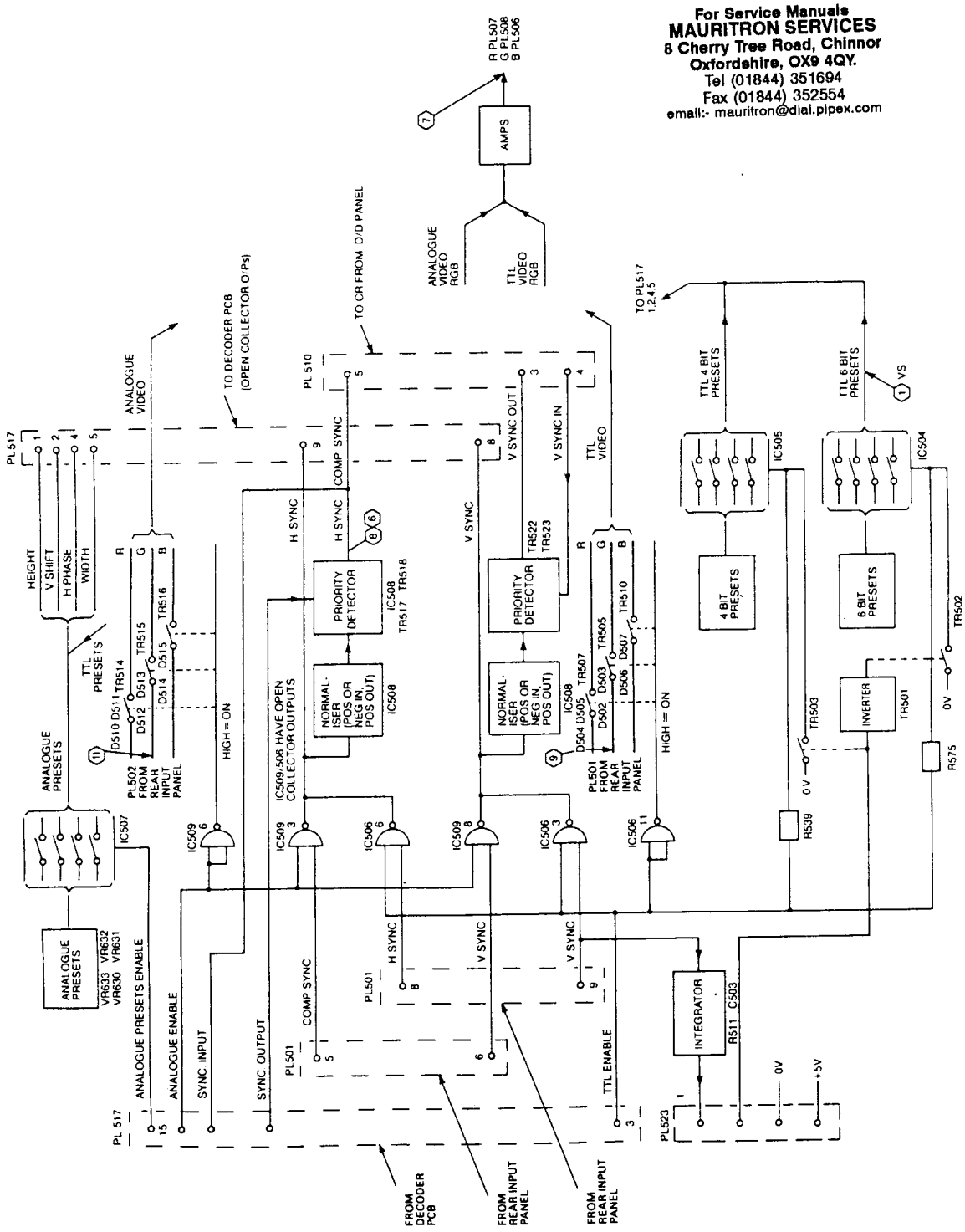
The PS2 H Sync and V Sync are gated through AND gates IC409c and d (on the PS2/Differential Input Panel) by the /TTL Enable signal, and are output at PL404.

The PS2 R,G,B inputs are at PL514,PL515 and PL516.



INTERFACE PCB : SWITCHING CONTROL DEALING ROOM MODELS

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INTERFACE PCB : SWITCHING CONTROL
604/704 MODELS

SERIES 7 MK2: INTERFACE PCB: COMPONENTS LIST

COMPONENTS LIST

A Components List is given for one PCB, under its Assembly number. A list of differences is given for each variant of that PCB, under its own Assembly number.

The appropriate Assembly number for a PCB in a particular model may be found by reference to Table 1 in the Introduction to this Manual.

In the Components Lists, the following abbreviations are used.

RESISTORS	CAPACITORS
CC Carbon Composition	AE Aluminium Electrolytic
CF Carbon Film	C Ceramic
MF Metallised Fim	CT Ceramic Tube
MO Metal Oxide	MP Metallised Polymer
TH Thermistor	PC Poly Carbonate
WW Wire Wound	PS Polystyrene
	T Tantalum

PTC Positive Temperature Coefficient.

INTERFACE PCB AO3858.

RESISTORS

Circuit Reference	Component Reference	Component Description
R510,529,534-535,541, 542,548,550,555,556, 563,590-594,620-623, 640,648,650,654,656, 668,678,679,681,685, 708,721,737,771-773, 780	RF103 DJO	1K0 1/4W 5% CF
R511,560,564,595,635, 680,693,697,698,717, 722,728,741,748,751	RF472 DJO	470R 1/4W 5% CF
R512,513,516,517,658, 663	RF104 DJO	10K 1/4W 5% CF
R514,515,557,562,637, 652,671,695,724,747	RF473 DJO	4K7 1/4W 5% CF
R518,694,725,766	RF222 DJO	220R 1/4W 5% CF

SERIES 7 MK2: INTERFACE PCB: COMPONENTS LIST

RESISTORS

Circuit Reference	Component Reference	Component Description
R519,523-525,561,565, 636,651,655,665,677, 763-765	RF223 DJO	2K2 1/4W 5% CF
R520,522,696,723,746, 761,768	RF153 DJO	1K5 1/4W 5% CF
R521,576,625,673,674, 701,702,726,730,752, 754,755,762	RF682 DJO	G80R 1/4W 5% CF
R526	RF822 DJO	820R 1/4W 5% CF
R527,530,532,600-602	RF181 DJO	18R 1/4W 5% CF
R537,545,552,611,613, 615,657,683,704,716, 796	RF683 DJO	6K8 1/4W 5% CF
R538,546,554,616-618, 686,705,733	RM272 HHO	270R .6W 1% MF
R539,575	RF184 DJO	18K 1/4W 5% CF
R540,544,553,610,612, 614,682,703,731	RF391 DJO	39R 1/4W 5% CF
R543,547,551,606-608, 684,706,732	RF124 DJO	12K 1/4W 5% CF
R577,626	RF183 DJO	1K8 1/4W 5% CF
R624,649,667,688-691,713,715,718, 720,736,738,740, 744	RF102 DJO	100R 1/4W 5% CF
R639,711,735,770	RF471 DJO	47R 1/4W 5% CF
R641	RF332 DJO	330R 1/4W 5% CF
R653	RF225 DJO	220K 1/4W 5% CF
R659	RF336 DJO	3M3 1/4W 5% CF
R660	RM824 DIO	82K 1/4W 2% MF
R661	RM683 DHO	6K8 1/4W 1% MF
R662	RM125 DHO	120K 1/4W 1% MF

SERIES 7 MK2: INTERFACE PCB: COMPONENTS LIST

RESISTORS

Circuit Reference	Component Reference	Component Description
R669	RF334 DJO	33K 1/4W 5% CF
R670	RF105 DJO	100K 1/4W 5% CF
R672	RW271 RJ5	27R 5W 5% WW
R676	RF823 DJO	8K2 1/4W 5% CF
R687,714,743	RF152 DJO	150R 1/4W 5% CF
R692,700,712,727, 742,753	RF821 DJO	82R 1/4W 5% CF
R710,745,767	RF563 DJO	5K6 1/4W 5% CF
R756	RF106 DJO	1M0 1/4W 5% CF
R793	RL101 DJO	10R 1/4W 5% CF
C585	RF104 DJO	10K 1/4W 5% CF
LK500,509	RF472 DJO	470R 1/4W 5% CF
LK555	RF223 DJO	2K2 1/4W 5% CF

CAPACITORS

C501,504,508,526-528,531,586,587	CK224 FQO	22n 25V 30% CT
C502,535,536,539, 541,543,546,547, 550,562,564,573, 584,592	CA107 JL7	10n 50V 20% AE
C503,555,568,580, 593	CA227 FM7	22u 25V AE
C506,510,512,520-522,538,558,559, 563,566,574,576, 583	CA108 FM7	100u 25V AE
C523-525,552,554, 557,567,571	CD561 RL6	56p 400V 20% C
C529,530,532	CA108 FL7H	100u 25V 20% AE
C533	CA107 JL7H	10u 50V 20% AE
C540	CK102 JJO	100p 50V 5% CT

SERIES 7 MK2: INTERFACE PCB: COMPONENTS LIST

CAPACITORS

Circuit Reference	Component Reference	Component Description
C544	CM223 KJ9	2n2 100V 5% MP
C545,556,570,581	CM105 NK6	100n 250V 10% MP
C549	CM105 NJ6	100n 250V 5% MP
C551,553,565,569, 577,579	CD473 KK6	4n7 100V C
C578,582	CD561 RL6	56p 400V 20% C
C591	CM105 NK7	100n 250V 10% MP
C594	CK103 JKO	1n 50V CT
C595	CM225 KK6	220n 100V MP
C596	CA476 JL7	4u7 50V 20% AE
C597	CD472 SK7	470p 500V C
C599	CM474 KK6	47n 63V MP

DIODES

D501-507,510-515, 522-526,529,531-536,538	DS4148 UTO	1N4148
D516,518	DZ7951 OFBO	Zener BZX79B5V1 2%
D17	DZ6151 OJCO	Zener BZX61C5V1 5%
D527	DZ7968 OFBO	Zener BZX79B6V8 2%
D528	DZ7933 0FBO	Zener BZX79B3V3 2%
D537	DP4007 UUO	IN4007

TRANSISTORS

TR501-503,521,522, TR504,506,508,511-513	Q50237 UUO	BC237P
520,530-532,534, 536,538,541	Q54125 UU5	2N4125
TR505,507,510,514-516,526,528	Q50337 UUO	BC337-RL1
TR523,524	QS4123 UUO	2N4123

SERIES 7 MK2: INTERFACE PCB: COMPONENTS LIST

TRANSISTORS

Circuit Reference	Component Reference	Component Description
TR533,537,542	QS0020 UUO	BSX20
TR543-545	QF0111 UK1	J111 FET

INTEGRATED CIRCUITS

IC501	IT74126 MU2	74LS126
IC502	IT74138 PU2	74HCT138
IC503	IT4244 PU2	74HCT244N
IC504,505,507	IG4066 UUU	Quad Multiplexer
IC506,509	IT7426 MU2	74LS26
IC508	IT7486 GU2	74HC86
IC510	IA3O86 UU	3086 Transistor Array
IC511	IC7555 UG2	ICM7555IPA
IC512	IG4047 UU2	4047
IC513-515	IA3046 UU2	CA3046 Transistor Array
IC516	ILO393 NU2	LM393N

POTENTIOMETERS

VR528,531,533,603-605	RQ102 AL2	100R Preset
VR566,567,570-572, 574,630,632,633	RQ104 AL2	10K Preset
VR568,573,631	RQ473 AL2	4K7 Preset

INDUCTORS

L501-503	LW104 BK1	10uH 1205100K

SERIES 7 MK2: INTERFACE PCB: COMPONENTS LIST

INTERFACE PCB AO4098.

The Components List is as for AO3858, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R549	RF103 DJO	1K0 1/4W 5% CF
R661	RF683 DJO	6K8 1/4W 5% CF
PL503/3-13	RF332 DJO	330R 1/4W 5% CF
PL503/7-12	RF103 DJO	1K0 1/4W 5% CF

CAPACITORS

C540	CK181 JJO	18p 50V 5% CT
C552	CA108 FM7	100u 25V AE
C578,582	CD561 RL6	56p 400V 20% C

TRANSISTORS

TR543-545	QF0112 UK1	J1112 FET

SERIES 7 MK2: INTERFACE PCB: COMPONENTS LIST

INTERFACE PCB AO3225

The Components List is as for AO3858, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
RU1	RN008 BJ5	1K array
R549,642	RF103 DJO	1K0 1/4W 5% CF
R596,597,598	RF222 DJO	220R 1/4W 5% CF
R626	Not fitted	
R639,647,794	RF104 DJO	10K 1/4W 5% CF
R643	RF223 DJO	2K2 1/4W 5% CF
R644,646,678	RF473 DJO	4K7 1/4W 5% CF
R645	RF225 DJO	220K 1/4W 5% CF
R672	Not fitted	
R676	Not fitted	
R768	RF106 DJO	1M0 1/4W 5% CF

CAPACITORS

C533	Not fitted	
C552	CA108 FM7	100u 25V AE
C578,582	CD561 RL6	56p 400V 20% C
C585	CM105 NK6	100n 250V 10% MP
C591	Not fitted	

DIODES

D520,521,530	DS4148 UTO	1N4148
D537	Not fitted	

TRANSISTORS

TR517,518	QS0237 UUO	BC237P

SERIES 7 MK2: INTERFACE PCB: COMPONENTS LIST

INTERFACE PCB AO3510.

RESISTORS

Circuit Reference	Component Reference	Component Description
R549,642,734,755	RF103 DJO	1K0 1/4W 5% CF
R561,565,636,644, 646,794	RF104 DJO	10K 1/4W 5% CF
R596-598	RF152 DJO	150R 1/4W 5% CF
R600-602	RF471 DJO	47R 1/4W 5% CF
R643-647	RF223 DJO	2K2 1/4W 5% CF
R645	RF225 DJO	220K 1/4W 5% CF
R661	RF683 DJO	6K8 1/4W 5% CF
R662	RF125 DJO	120K 1/4W 5% CF
R672	RW331 RJJ	33R 5W 5% WW
R686,705,733	RF272 DJO	270R 1/4W 5% CF
R768	RF106 DJO	1M0 1/4W 5% CF
RU1	RN008 BJ5	IK Array

CAPACITORS

C515,516,537	CA107 JL7	10n 50V 20% AE
C552	CA108 FM7	100u 25V AE
C578,582	CD561 RL6	56p 400V 20% C
C585	CM105 NK6	100n 250V 10% MP

DIODES

D508,520,521,530	DS4148 UTO	1N4148
D528	DZ7956 OFBO	Zener BZX79B5V6 2%
D529	Not fitted	
Between C539 & R568	DZ7991 OFBO	Zener BZX79B9V1 2%

SERIES 7 MK2: INTERFACE PCB: COMPONENTS LIST

TRANSISTORS		
TR517,518	QS0237 UUO	BC237P
TR535	QS4125 UU5	2N4125
POTENTIOMETERS		
VR774	RQ104 AL2	10K Preset

INTERFACE PCB AO3510

The Components List is as for AO3858, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R561, 636, 794	RF104DJO	10K 1/4W 5% CF
R565	Not Fitted	
R596, 596, 598	RF152DJ0	150R 1/4W 5% CF
R600	Not Fitted	
R601, 602, 639	RF471DJO	47R 1/4W 5% CF
R642, 734, 775	RF103DJO	1K0 1/4W 5% CF
R643, 647	RF223DJO	2K2 1/4W 5% CF
R644, 646	RF473DJO	4K7 1/4W 5% CF
R645	RF225DJO	220K 1/4W 5% CF
R672	RW331RJ5	33R 5W 5% WW
R768	RF106DJO	1M0 1/4W 5% CF
RU1	RN008BJ5	1K0 9 pin SIL

CAPACITORS

C515, 516, 537	CA107JL7	10u 50V 20% AE
C585	CM105NK6	100n 250V 10% MP

TRANSISTORS

TR517, 518	QS0237UU0	BC237P
TR535	QS4125UU5	2N4125

DIODES

D508, 520, 521, 530	DS4148UTO	1N4148

ZENER DIODES

C539 + R568	DZ79910FBO	BZX79B9V1 0.4W 2%

POTENTIOMETERS

VR774	RQ104AL2	10K 0.1W 20%

SERIES 7 MK2: INTERFACE PCB: COMPONENTS LIST

INTERFACE PCB AO4537

The Components List is as for AO3858, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R565	Not Fitted	
R561, 636, 796	RF104DJO	1OK 1/4W 5% CF
R600, 601, 602, 643, 647	RF223DJO	2K2 1/4W 5% CF
R642, 734, 775	RF103DJO	1K0 1/4W 5% CF
R644, 646	RF473DJO	4K7 1/4W 5% CF
R645	RF225DJO	220K 1/4W 5% CF
R672	RW331RJ5	33R 5W 5% WW
R768	RF106DJO	1M0 1/4W 5% CF
RU1	RN008BJ5	1K 9 pin SIL

CAPACITORS

C515, 516, 537	CA107JL7	10u 50V 20% AE
C533	Not Fitted	
C585	CM105NK6	100n 250V 10% MP
C596	CA227FM7	22u 25V AE

TRANSISTORS

TR517,518	QS0237UU0	BC237P
TR535	QS4125UU5	2N4125

DIODES

D508, 520, 521, 530	DS4148UTO	1N4148

POTENTIOMETERS

VR603, 604, 605	RQ473AL2	4K7 0.1W 20%
VR774	RQ104AL2	10K 0.1W 20%

SERIES 7 MK2: USER CONTROLS

USER CONTROLS PCBs

GENERAL

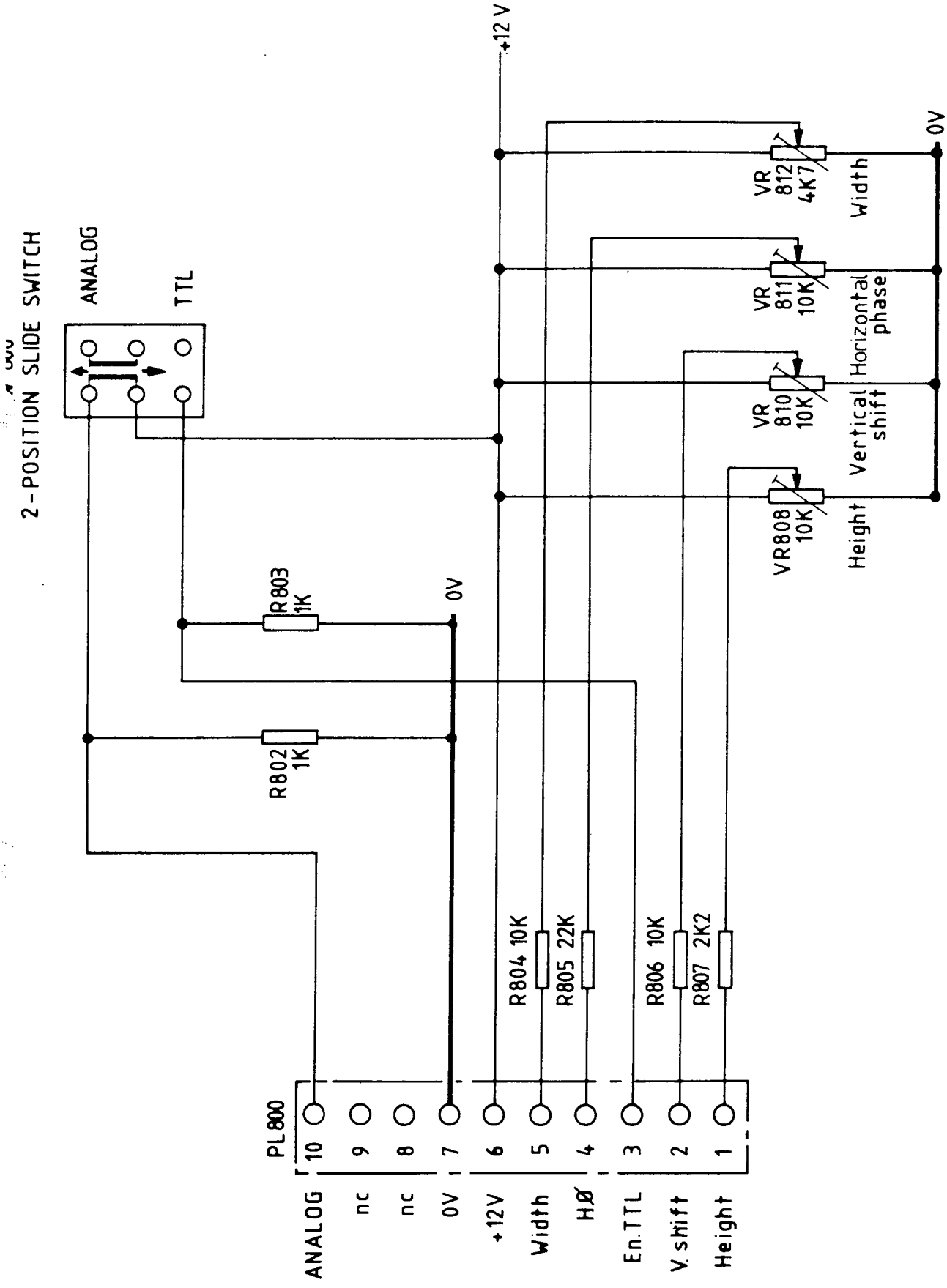
This section gives the following information on the User Controls PCBs for each Series 7 Mk 2 model.

Circuit diagram Components list

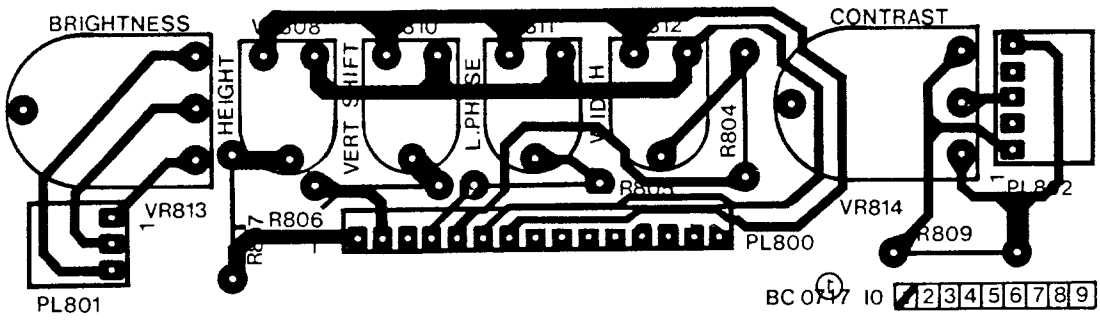
Layout diagram

These are identified by Drawing Numbers.

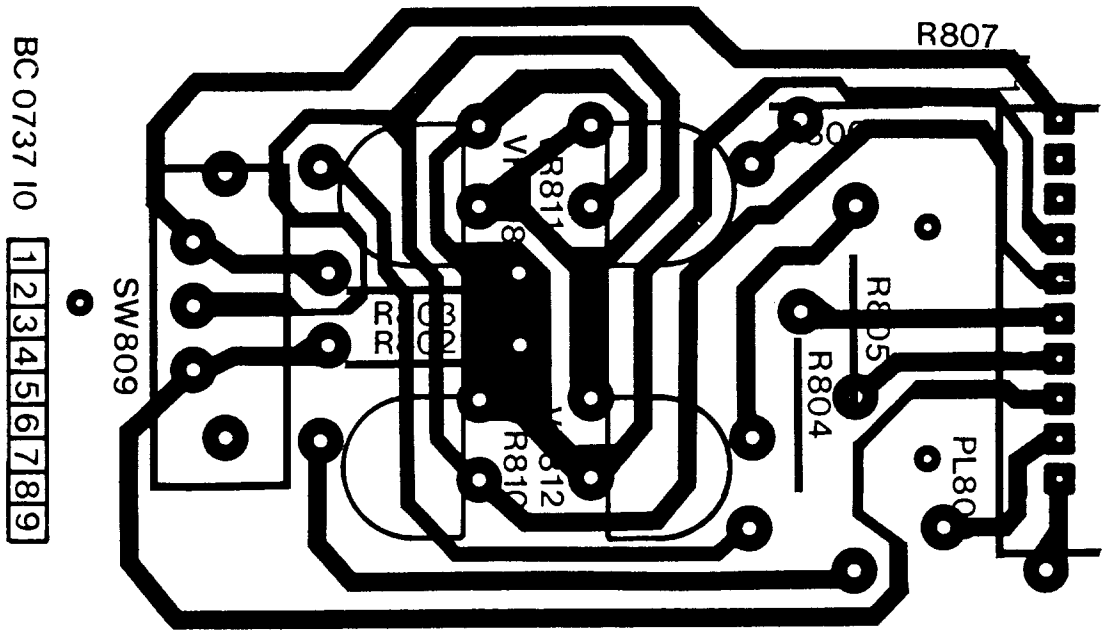
Table 1 in the Introduction to this manual relates Model Numbers to these Drawing Numbers, so that the drawings appropriate to a particular model may be selected.



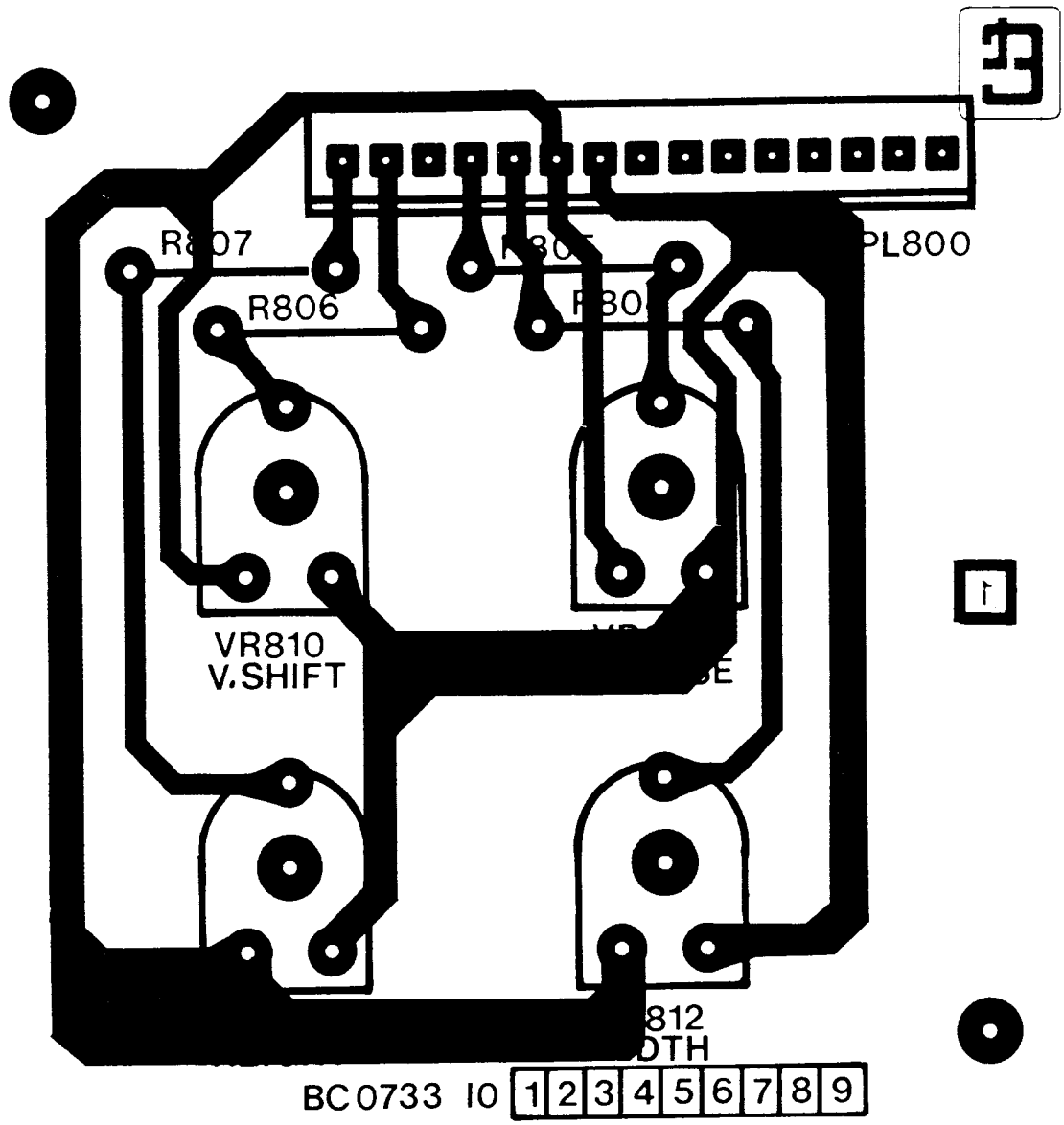
USER CONTROLS 14" MODELS
Drg. No. GO1219 (Sht 1 of 1)



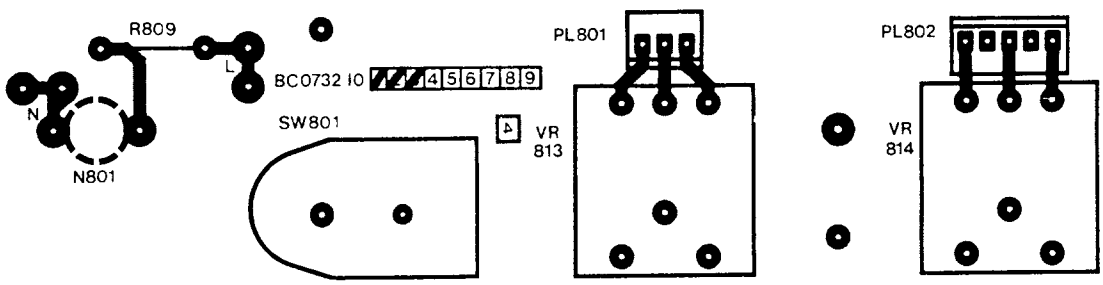
FRONT CONTROLS PCB
12L72DNR1, 12L71DNR1, 12L71DNS3 MODELS



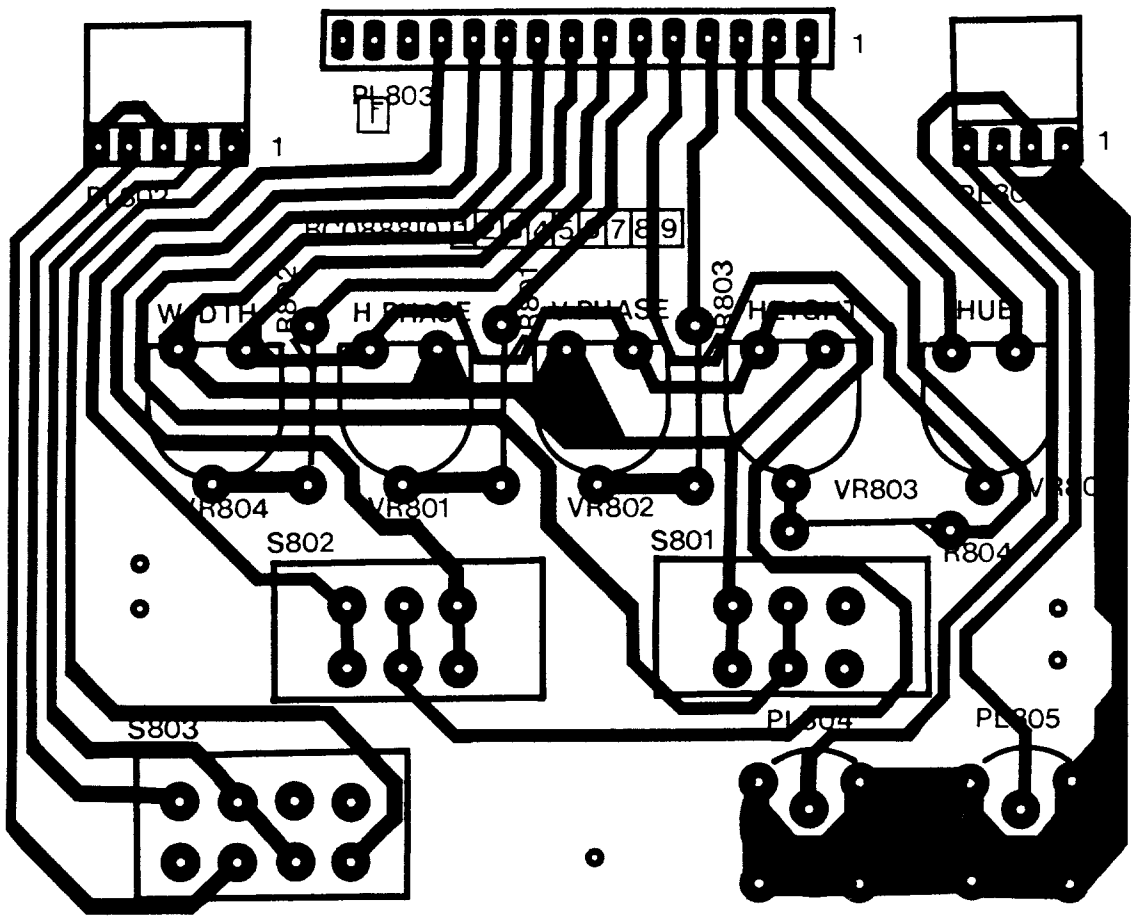
FRONT CONTROLS PCB 12L72DRR1



REAR CONTROLS PCB 12L72DRR1

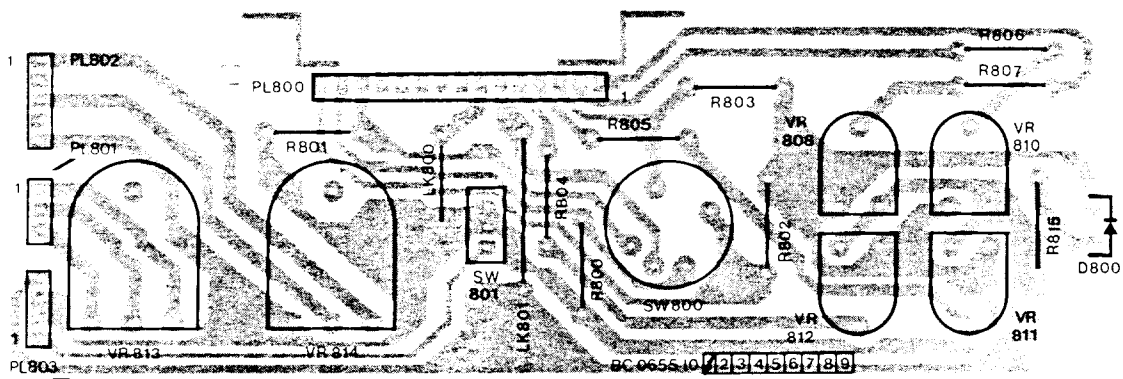


REAR CONTROLS PCB
14" MODELS AND 705 MODELS



REAR CONTROLS PCB 604/704 MODELS

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FRONT CONTROLS PCB 20" MODELS

SERIES 7 MK2: USER CONTROLS PCBs: COMPONENTS LIST

COMPONENTS LIST

A Components List is given for one PCB, under its Assembly number. A list of differences is given for each variant of that PCB, under its own Assembly number.

The appropriate Assembly number for a PCB in a particular model may be found by reference to Table 1 in the Introduction to this Manual.In the Components Lists, the following abbreviations are used.

RESISTORS	CAPACITORS
CC Carbon Composition	AE Aluminium Electrolytic
CF Carbon Film	C Ceramic
MF Metallised Film	CT Ceramic Tube
MO Metal Oxide	MP Metallised Polymer
TH Thermistor	PC Poly Carbonate
WW Wire Wound	PS Polystyrene
	T Tantalum

PTC Positive Temperature Coefficient.

CONTROL PCBs FRONT CONTROL PCB AO3355 (There is no Rear Control PCB)

Circuit Reference	Component Reference	Component Description
	BC0717 IO2	Control PCB
PL800	KP1151 A15	15 way
PL801	KP1032 AO3	3 way
PL802	KP1052 A05	5 way
R804	RF333 DJO	3K3 1/4W 5% CF
R805	RF104 DJO	10K 1/4W 5% CF
R806	RF473 DJO	4K7 1/4W 5% CF
R807	RF473 DJO	4K7 1/4W 5% CF
VR808	RQ104 CL01	10K Preset
VR810	RQ104 CL01	10K Preset
VR811	RQ104 CL01	10K Preset
VR812	RQ473 CL01	4K7 Preset
VR813	RV104 DV14	10K Control Linear (Brightness)
VR814	RV474 DV5	47K Control Linear (Contrast)

SERIES 7 MK2: USER CONTROLS PCBs: COMPONENTS LIST

FRONT CONTROL PCB AO2975, AO4051.

Circuit Reference	Component Reference	Component Description
	BC0732 IO4	Controls PCB
PL801	KP0026 YO3	3 way
PL802	KP0025 AO5	5 way
R809	RF155 DJO	150K 1/4W 5% CF
VR813	RV104 FL1	10K Control Linear (Brightness)
VR814	RV474 FLO	47K Control Linear (Contrast)
-	SR0004 UUO	Rotary Switch (Not fitted on AO4051)
N801	VN0007 GUO	Neon (GL4-01000)

SERIES 7 MK2: USER CONTROLS PCBs: COMPONENTS LIST

REAR CONTROL PCB AO2976.

Circuit Reference	Component Reference	Component Description
	BC0733 IO1	Controls (Rear) PCB
PL800	KP0026 A15	15 way
R804	RF333 DJO	3K3 1/4W 5% CF
R805	RF223 DJO	2K2 1/4W 5% CF
R806	RF474 DJO	4K7 1/4W 5% CF
R807	RF473 DJO	4K7 1/4W 5% CF
VR808	RQ104 CLO	10K Preset Linear
VR810	RQ104 CLO	10K Preset Linear
VR811	RQ104 CLO	10K Preset Linear
VR812	RQ473 CLO	4K7 Preset Linear

SERIES 7 MK2: USER CONTROLS PCBs: COMPONENTS LIST

REAR CONTROLS PCB AO3230. (There is no Front Control PCB).

Circuit Reference	Component Reference	Component Description
	BC0888 IO1	PCB Rear Controls
R801	RF223 DJO	2K2 1/4W 5% CF
R802	RF333 DJO	3K3 1/4W 5% CF
R803	RF473 DJO	4K7 1/4W 5% CF
R804	RF473 DJO	4K7 1/4W 5% CF
VR801	RQ104 CLO	10K Preset Linear
VR802	RQ104 CLO	10K Preset Linear
VR803	RQ104 CLO	10K Preset Linear
VR804	RQ473 CLO	4K7 Preset Linear
VR805	RQ473 CLO	4K7 Preset Linear
S801	SS0008 UUO	Switch, slide 2P2T
S802	SS0008 UUO	Switch, slide 2P2T
S803	SS0009 UUO	Switch, slide 2P3T
PL801	KP3484 AO4	4 way
PL802	KP3485 AO5	5 way
PL803	KP1151 A15	15 way
PL804	KS0002 XO1	Phono Socket
PL805	KS0002 XO1	Phono Socket

SERIES 7 MK2: USER CONTROLS PCBs: COMPONENTS LIST

REAR CONTROL PCB AO3030. (There is no Front Control PCB).

Circuit Reference	Component Reference	Component Description
	BC0737 IO1	PCB Controls (Rear)
PL800	KP7395 BO5	5 way
R802	RF103 DJO	1KO 1/4W 5% CF
R803	RF103 DJO	1KO 1/4W 5% CF
R804	RF104 DJO	10K 1/4W 5% CF
R805	RF224 DJO	22K 1/4W 5% CF
R806	RF104 DJO	10K 1/4W 5% CF
R807	RF223 DJO	2K2 1/4W 5% CF
VR808	RQ104 CLO	10K Preset Linear 0.15W
SW809	SS0005 UUO	Slider switch 50MP 44032A(ITT)
VR810	RQ104 CLO	10K Preset Linear 0.15W
VR811	RQ104 CLO	10K Preset Linear 0.15W
VR812	RQ473 CLO	4K7 Preset Linear 0.15W

MAINS INDICATOR PCB AO2684.

Circuit Reference	Component Reference	Component Description
-	BC0656 IO2	PCB Mains Indicator
-	RM272 FJO	270R 0.4W 5% MF
-	KP5267 AO2	2 way Molex Plug
		5267-02A
-	VN0007 RUO	Red LED SPR5551 REC

SERIES 7 MK2: DECODER PCB

GENERAL

This section gives the following information on the Decoder PCB for each Series 7 Mk 2 model that uses it.

Circuit diagram Waveform diagram

Layout diagram Components List

These are identified by Drawing Numbers.

Table 1 in the Introduction to this manual relates Model Numbers to these Drawing Numbers, so that the drawings appropriate to a particular model may be selected.

A circuit description is given.

SIGNAL SELECT LOGIC (PAL/NTSC FEATURE)

A comparison between the Signal Switching Diagram given here, and that for the Basic Model given in Part 1, shows the extra switching and logic required for the PAL/NTSC feature.

NOTE

The symbol \, preceding a signal title, indicates a logical "NOT".

SELECT TTL

If TTL is selected, the ANALOGUE/TTL switch outputs are TTL Enable and \Analogue Enable. TTL Enable selects TTL RGB and the TTL Presets on the Interface PCB. \Analogue Enable inhibits the 16kHz Preset output of And gate A. This has the following effects:

(1) It produces \Enable PAL/NTSC Presets.

(2) Via the inverter, it inhibits And gate B, producing \Enable Analogue Presets.

(3) Via the inverter, it inhibits the Fast Blanking signal.

Thus the selected TTL has an unimpeded route to the display and is controlled by its own preset controls.

SELECT ANALOGUE

If Analogue is selected, the ANALOGUE/TTL switch outputs are \TTL Enable and Analogue Enable. \TTL Enable inhibits the TTL Presets. Analogue Enable has two functions:

(1) It prepares And gate A for a 16kHz Preset input.

(2) It prepares And gate B for a second input.

If \16kHz Preset, then the inverter provides a second input to And gate B, enabling the Analogue Presets. If 16kHz Present, this provides an inhibit to And gate B, so the analogue Presets are inhibited. At the same time, 16kHz Present enables the sandcastle generator to provide timing to the composite video decoder, and enables the PAL/NTSC Presets.

CIRCUIT DESCRIPTION

POWER SUPPLY

Power enters the Decoder PCB on PL11P from the Drive Deflection PCB; B+ and +6.3V route through the Decoder PCB to the Interface PCB; +23V is used on the Decoder PCB to generate +15V and +12V.

IC13P, a -15V linear regulator supplies power to the audio circuit IC9, IC10, IC11P. It is supplied from the +23V rail.

IC6P is an L4962 switching regulator. This switches current, with a variable mark-space ratio, into the choke L15P. The flywheel diode D22P continues to conduct current when the regulator switch is off. The reservoir capacitor C57P sustains a steady, regulated +12V across itself. This is divided down by R105P and R104P. The divided voltage is compared with an internal reference to control the output voltage.

The +12V feeds the decoder video circuit, the touchscreen and the interface panel (via PL12P). The +5V touchscreen supply is regulated by the linear voltage regulator IC12P, from the +12V rail.

The -12V touchscreen supply is generated by AC coupling the switching output through C56P and clamping the most positive excursion to the OV rail with D23P. The most negative excursion of the waveform is then detected by D24P forming a steady negative voltage across C59P. IC8P regulates this to -12V. Touchscreen supplies leave via PL10P.

SANDCASTLE GENERATION

Composite video enters on pin 4 of PL1P. In RGB mode this may be used as an input for mixed syncs. Video then branches off to pin 11 of the line sync processor, IC1P. This derives (from video sync pulse information) a phase-locked pulse on pin 4, coincident with the leading edge of syncs on pin 11. This is differentiated by C12P/R10P, the falling slope of which is used to generate a sandcastle pulse as it passes through thresholds set up on the comparators of IC2Pa, b, and c. IC2Pd creates a false flyback pulse to sustain the operation of IC1P. VR1P sets the free running line frequency to 15-16kHz. When higher frequencies are presented IC1P will not lock and pin 7 goes low. Loss of IC1P lock blanks the composite decoded outputs via TR1P and TP17P, switches out the composite geometry VR4P-7P via ICSP, and switches in component geometry presets on the Interface PCB via TR1P and TR20P.

DECODER

Incoming video enters the PAL/NTSC decoder, IC4P, on pin 37, having been terminated by R43P. A -3X amplifier in IC4P has its output on pin 35 and is buffered by TR2P. This distributes video to the chroma bandpass filters, the luma delay line and the sync separator.

LUMINANCE

Video passes into the luminance chain through the luma delay line DL1P and to pin 36 of IC4P. The chroma notch filters (PAL: L8P and C38P; NTSC: L9P and C39P) are switched in, as appropriate, by IC7Pa and b. These remove the chrominance subcarrier information from the composite video signal. The remaining luminance information passes on, through internal contrast and brightness circuits, to the colour matrices at the decoder outputs.

CHROMINANCE

Video passes into two chroma bandpass filters: via R23P into the PAL filter, and via R22P into the NTSC filter. IC3d selects PAL or NTSC filter outputs to the chrominance input of IC4P on pin 1. Chroma passes internally through IC4P and is processed for Automatic Colour Control, Hue, Contrast and Saturation. Antiphase outputs for driving the chroma delay line leave IC4P at pins 3 and 4. The inverted signal on pin 3 is used to perform the PAL additions and subractions to the delayed chrominance by means of the PAL balance controls VR2P and L7P. IC3P a and b switch the chroma delay line in and out for PAL and NTSC operations. In PAL V and U subcarrier signals are respectively fed to pins 7 and 8 of IC4P where they are internally demodulated. As appropriate to NTSC or PAL, X1P or X2P are selected by IC3Pc to demodulate to the baseband U and V signals which are then combined with luminance to generate R, G and B outputs.

DECODER OUTPUTS

Divided down R, G and B outputs are applied to feedback inputs of IC4P (pins 22, 19 & 16): these inputs sample black level during the first two lines, after frame syncs. The sampled value is held on a capacitor. It is compared with an internal reference which readjusts the DC output level to hold it constant. VR3P is adjusted so that the sampled output level is the same as the signal black level; this ensures that the black remains constant as the gains are changed (VR8P, VR9P, VR10P). Decoder brightness variation is now achieved by adding a DC offset into the feedback pins from the decoder brightness potentiometer VR11P.

SYNC SEPARATOR/CLAMP PULSE GENERATOR

Amplified and inverted video from the emitter of TR2P is further amplified by TR22/23/24P, where synchronising pulses are amplified linearly but the video component is clipped off. Resulting negative- going 3V p-p syncs pass from the Decoder PCB to the sync switching on the Interface PCB. Selected syncs return to the Decoder PCB and are sliced and separated by the comparator TR25/26P. C50P delays the leading edge of the syncs by 0.5us. The resulting clamp-pulse- generating output on the collector of TR27 is an 11V p-p pulse with a fast, delayed leading edge. This pulse passes from the Decoder PCB to the Interface PCB where the leading edge triggers a 1us wide clamp pulse, positioned 0.5us after the beginning of the sync pulse.

FAST SWITCHING

TR3P-TR14P from three fast, single-pole, two-way switches driven from the comparator formed by TR15P- TR12P. These fast-switch outputs to the tubebase (PL2,3 and 4) between the Decoder PCB outputs and the Interface PCB outputs are from loose pins P1-6. Each switch has two pairs of emitter followers feeding a common output and the switches are turned off by biasing the output transistors off with diodes D8, D10, D12 pulling low. The two sets of three diodes are driven differentially from the outputs of the fast switching comparator TR15P - TR21P. Fast blanking of the Decoder PCB outputs, in favour of the analogue source from the Interface PCB, takes place when the base of TR19P is taken above the threshold set on the base of TR18P (approx 2V). Slower blanking (for instance to inhibit decoder outputs when no PAL or NTSC broadcast source is present) is achieved by switching TR17P, which operates in parallel to TR19P. Frame flyback blanking of the decoder outputs is done by forcing the comparator output low via D13P.

AUDIO

When Analogue is selected (PL5P pin 1 high), audio from PL1P pins 6 and 8 is switched in by IC9Pa and d. When TTL is selected (PL5P pin 3 high) audio from PL6P pins 2 and 4 is switched in by IC9Pb and c. Selected sources leave the Decoder PCB for the volume control and return to the output amplifiers (IC10P and IC1IP) via PL7P. Power amplifier output leave to the headphone sockets via PL8P. When no headphones are plugged in, the right channel output is routed back onto the Decoder PCB, divided down and added into the left channel. The resulting monophonic addition from the left channel output similarly loops out and back through the headphone socket and then feeds the internal speaker via PL9P.

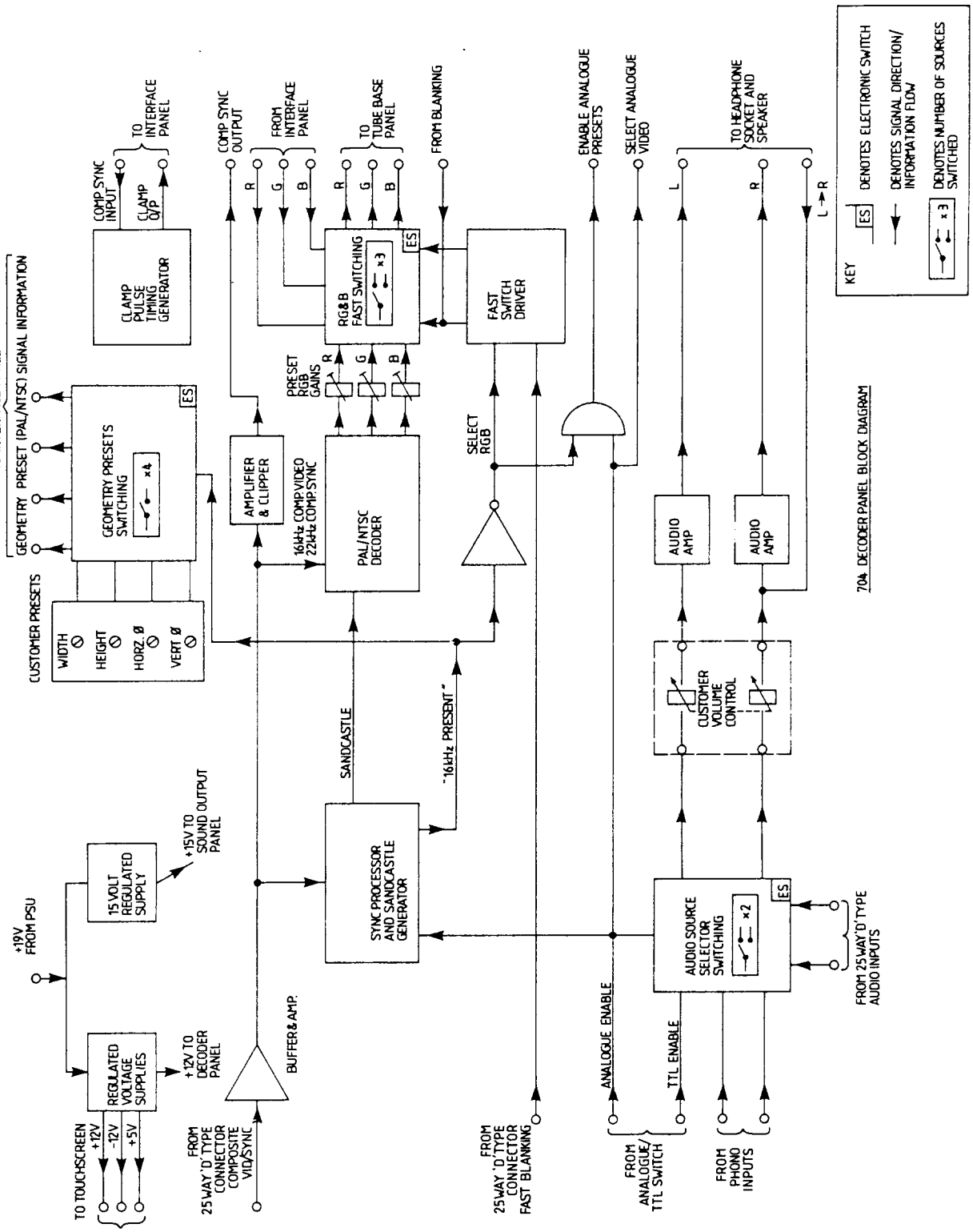


FIG. 1 DECODER PCB BLOCK DIAGRAM

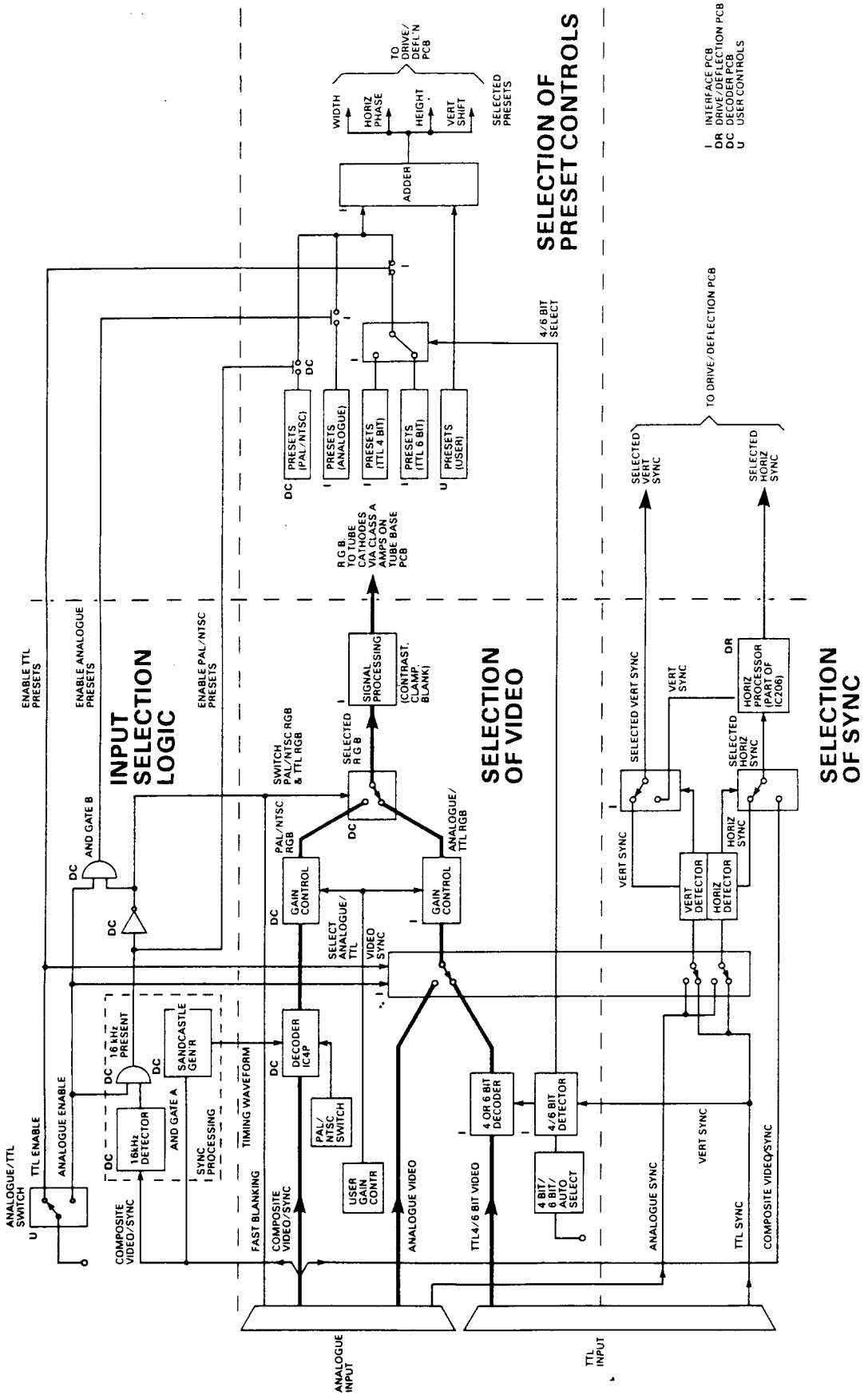


FIG. 2 PAL/NTSC SIGNAL SELECTION DIAGRAM

SERIES 7 MK2: DECODER PCB: COMPONENTS LIST

COMPONENTS LIST

A Components List is given for one PCB, under its Assembly num ber. A list of differences is given for each variant of that PCB, under its own Assembly number.

The appropriate Assembly number for a PCB in a particular model may be found by reference to Table 1 in the Introduction to this Manual.

In the Components Lists, the following abbreviations are used.

RESISTORS	CAPACITORS
CC Carbon Composition	AE Aluminium Electrolytic
CF Carbon Film	C Ceramic
MF Metallised Film	CT Ceramic Tube
MO Metal Oxide	MP Metallised Polymer
TH Thermistor	PC Poly Carbonate
WW Wire Wound	PS Polystyrene
	T Tantalum

PTC Positive Temperature Coefficient.

DECODER PCB AO3978.

RESISTORS

Circuit Reference	Component Reference	Component Description
R1P,7P,16P-18P,20P 25P,75P,85P,90P,92P, 102P,119P,120P	R473 DJO	4K7 1/4W 5% CF
R2P	RF685 DJO	680K 1/4W 5% CF
R3P	RF825 DJO	820K 1/4W 5% CF
R4P	RF125 DJO	120K 1/4W 5% CF
R5P,82P,89P,115P	RF105 DJO	100K 1/4W 5% CF
R6P,155P	RF124 DJO	12K 1/4W 5% CF
R8P	RF475 DJO	470K 1/4W 5% CF
R9P,21P,55P,61P,67P, 80P,88P,95P,96P,109P-114P	RF103 DJO	1K0 1/4W 5% CF
R10P,49P,128P,129P	RF104 DJO	10K 1/4W 5% CF
R11P	RM393 HHO	3K9 .6W 1% MF
R12P	RM153 DIO	1K5 1/4W 2% MF

SERIES 7 MK2: DECODER PCB: COMPONENTS LIST

RESISTORS

Circuit Reference	Component Reference	Component Description
R13P,87P	RF222 DJO	220R 1/4W 5% CF
R14P	RM363 HHO	3K6 .6W 1% MF
R15P	RF333 DJO	3K3 1/4W 5% CF
R19P,23P,27P,71P,74P	RF562 DJO	560R 1/4W 5% CF
R22P,26P,47P,78P,99P	RF472 DJO	470R 1/4W 5% CF
R24P,138P	RF393 DJO	3K9 1/4W 5% CF
R28P	RF106 DJO	1MO 1/4W 5% CF
R29P,53P,56P,59P,62P, 65P,68P,86P	RF102 DJO	100R 1/4W 5% CF
R30P,31P,36P	RF392 DJO	390R 1/4W 5% CF
R32P,93P,101P	RF183 DJO	1K8 1/4W 5% CF
R33P	RF225 DJO	220K 1/4W 5% CF
R34P,35P,100P	RF184 DJO	18K 1/4W 5% CF
R37P-39P	RM682 DHO	680R 1/4W 1% MF
R40P-42P	RM332 DHO	330R 1/4W 1% MF
R43P	RF821 DJO	82R 1/4W 5% CF
R44P,45P	RF123 DJO	1K2 1/4W 5% CF
R46P,137P	RF473 DJO	4K7 1/4W 5% CF
R48P,103P	RF154 DJO	15K 1/4W 5% CF
R50P,51P,91P,98P	RF223 DJO	2K2 1/4W 5% CF
R52P,58P,64P,70P	RF183 DJO	1K8 1/4W 5% CF
R54P,60P,66P	RF682 DJO	680R 1/4W 5% CF
R57P,63P,69P	RF332 DJO	330R 1/4W 5% CF
R72P,73P,76P	RF822 DJO	820R 1/4W 5% CF
R77P,97P,149P	RF153 DJO	1K5 1/4W 5% CF
R79P,81P	RF221 DJO	22R 1/4W 5% CF
R94P	RF823 DJO	8K2 1/4W 5% CF
R104P	RM473 DIO	4K7 1/4 2% MF
R105P	RM623 DIO	6K2 1/4 2% MF
R106P	RF101 DJO	10R 1/4W 5% CF
R107P	RF15 DJO	150K 1/4W 5% CF
R108P	RF275 DJO	270K 1/4W 5% CF

SERIES 7 MK2: DECODER PCB: COMPONENTS LIST

RESISTORS

Circuit Reference	Component Reference	Component Description
R121P,127P,130P,135P	RF224 DJO	22K 1/4W 5% CF
R122P,132P	RF561 DJO	56R 1/4W 5% CF
R124P	RF394 DJO	39K 1/4W 5% CF
R125P,133P	RF100 DJO	1RO 1/4W 5% CF
R126P,134P	RF152 DJO	150R 1/4W 5% CF
R131P	RF471 DJO	47R 1/4W 5% CF
R136P	RF220 DJO	2R2 1/4W 5% CF
R139P,140P,141P	RF223 DJO	2K2 1/4W 5% CF
R142P,143P,144P	RM823 DHO	8K2 1/4W 1% MF
R145P,146P,147P	RM104 DHO	10K 1/4W 1% MF
R148P,152P	RF273 DJO	2K7 1/4W 5% CF
R150P,151P	RF391 GJO	39R 1/2W 5% MF
R153P,154P	RF474 DJO	47K 1/4W 5% CF

CAPACITORS

C1P,47P,48P,56P	CM475 8K6	470n 63V 10% MF
C2P	CJ473 JJO	4n7 50V 5% C
C3P,53P	CA476 JL7	4u7 50V 20% AE
C4P	CP473 NHO	4n7 250V 1% P
C5P,9P,13P,22P,25P, 27P,29P,34P,35P,40P-42P,44P,52P,58P,60P, 62P,75P,88P,93P	CM105 8K6	100n 63V 10% MP
C6P,20P,21P,23P,26P, 46P,87P	CK104 FLO	10n 25V 2% CT
C7P,8P,79P,86P	CM225 8KS	220n 63V 10% MP
C10P,36P,43P,74P,78P, 80P-82P,85P,92P	CA108 FM7	100u 25V AE
C11P	CQ224 FQO	22n 25V 30% CT
C12P	CP103 NHO	1n 250V 1% P
C14P,64P-66P	CK471 JJO	47p 50V 5% CT
C15P	CK331 JJO	33p 50V 5% CT
C16P	CK181 JJO	18p 50V 5% CT

SERIES 7 MK2: DECODER PCB: COMPONENTS LIST

CAPACITORS

Circuit Reference	Component Reference	Component Description
C17P	CK121 JJO	12p 50V 5% CT
C18P	CK102 JJO	100p 50V 5% CT
C19P,50P	CK681 JJO	68P 50V 5% CT
C24P,54P	CK223 JKO	2n2 50V 10% CT
C28P	CK103 JKO	1n 50V CT
C30P	CC680 KJ7	6p8/25p 100v CP
C31P,32P,33P	CM104 RK6	10n 400V 10% MF
C37P	CA337 EL7	33u 16V 20% AE
C38P,39P	CL152 KJ7	150p 100V 5% PP
C45P		
C49P,59P,61P,73P, 89P,90P	CA107 JL7	10u 50V 20% AE
C51P,	CA228 FM7	220u 25V AE
C55P	CR334 8K6	33n 63V P
C57P	CA109 JL7	1000u 50V 20% AE
C63P		
C67P-72P	CA106 JL7	1u 50V 20% AE
C76P,83P	CK222 JKO	220p 50V CT
C77P,84P	CA478 FM7	470u 25V AE
C91P	CM475 8K6	470n 63V MP

DIODES

D1P-21P,25P-29P,31P, 32P	DS414 UTO	1N4148
D22P	DF0852 UMO	MR852
D23P24P	DF0157	BA157
D30P	DZ7430 FBO	Zener BZX79B4V3 2%

TRANSISTORS

TR1P,22P,25P,26P	QS0307 UU5	BC307-5
TR2P,20P,21P,23P, 24P	QS0237 UUO	BC237P

SERIES 7 MK2: DECODER PCB: COMPONENTS LIST

TRANSISTORS

Circuit Reference	Component Reference	Component Description
TR3P,6P,7P,10P,11P, 14P-16P	QS4125 UU5	2N4125
TR4P,5P,8P,9P,12P, 13P,17P,18P,19P	QS4123 UUO	2N4123

INTEGRATED CIRCUITS

IC1P	IL2595 OP2	TDA2595
IC2P	IL0339 UU2	LM339
IC3P	IG4551 UM2	4551
IC4P	IL3301 UM3	TDA3301
IC5P,7P,9P	IG4066 UUU	Quad Multiplexer
IC6P	IV4962 PS8	L4962 1.5A
IC8P	IV7912 LMO	MC7912AC
IC10P,11P	IL0820 US2	TBA820M
IC12P	IV7805 MM3	78M05 Voltage Reg'r
IC13P	IV7815 UM3	MC7815CT 1.5A

POTENTIOMETERS

VR1P	RQ474 AL2	47K Preset
VR2P	RQ102 AL2	100R Preset
VR3P-6P	RQ104 AL2	10K Preset
VR7P	RQ473 AL2	4K7 Preset
VR8P-10P	RQ103 AL2	1K0 Preset
VR11P	RQ472 AL2	470R Preset

INDUCTORS

L1P,2P	LW474 5J1	47uH Choke
L3P,4P	LW105 SK2	100uH Choke
L5P,6P,11P-13P,19P	LW104 SK1	10uH B78108-S1103-X
L7P-9P	LV001 TA3	KAN K2819XM Choke
L10P		
L14P,20P	LW104 UR7	10uH Choke

SERIES 7 MK2: DECODER PCB: COMPONENTS LIST

INDUCTORS

Circuit Reference	Component Reference	Component Description
L15P	LO1282 IO1	Switching Regulator Choke-704
L16P-18P	LW332 SL1	330nH Choke B78108-T3331-M

DELAY LINES

DL1P	ED0001 PO1	DL470 Delay Line
DL2P	ED0002 PO1	DL711 Delay Line

CRYSTALS

X1P	XC0017 UU6	3.579545 MHz Crystal
X2P	XC0014 UU6	IQD Type P, A124D Crystal

SERIES 7 MK2: PS2/DIFFERENTIAL INPUT PCB

GENERAL

This section gives the following information on the PS2 Differential Input PCB for each Series 7 Mk 2 model that uses it.

Circuit diagram Waveform diagram

Layout diagram Components List

These are identified by Drawing Numbers.

Table 1 in the Introduction to this manual relates Model Numbers to these numbers, so that the drawings appropriate to a particular model may be selected.

A circuit description is given for the first circuit diagram in this section. Where other circuits differ significantly, supplementary descriptions are given.

For the Interconnection Diagram and other associated PCBs in a particular model, refer to the table of models and PCBs in the Introduction to this manual.

For differences between this and other, similar, Input PCBs, refer to Appendix A to this section.

INTRODUCTION

The PS2 Differential Input PCB Mk2 accepts the following inputs:

1. RGB Analogue video data with sync-on-green. This input, is teed off from three loop-through coaxial cables.

2. Either:

(a) A digital video input, which may be in 3 bit, 4 bit or 6 bit code in TTL format,

or

(b) An analogue video input in IBM PS2 (personal System 2) format.

For each of these inputs, syncs are on separate TTL lines.

One input connector accepts either the TTL or the PS2 input, and the setting of a TTL/PS2 selector switch configures the input circuits appropriately. If the input is TTL, a further selector switch enables the circuit to accommodate 3 bit, 4 bit or 6 bit working.

The function of the Differential Input PCB is to process the inputs to a format and to levels acceptable to the Interface PCB. This involves the following processes.

1. Providing separate outputs of RGB analogue video, TTL video (with 3 bit input converted to 6 bit output) and PS2 analogue video.

2. Providing separate sync outputs appropriate to the selected input, whether it be analogue, TTL or PS2.

3. Providing switching signals to enable the InterfacePCB to configure itself for the selected input.

4. Providing other, derived, control signals.

5. Reshaping pulses and retiming pulses to provide optimum conditions for the sync processor IC on the Drive Deflection PCB.

NOTE

The IBM PS2 computer requires an input to define the type of monitor to which it is connected.

To provide this input, connect pin 10 (0V) to pin 11 on the 15 pin D type connector at the computer end of the connecting cable.

CIRCUIT DESCRIPTION

RGB ANALOGUE INPUT

To minimise the effects of pick-up on a long cable, the RGB analogue inputs are fed as balanced signals on the core and screen of each of the three coaxial cables. Loop-through connectors enable a chain of monitors to be supplied. A switch (SW401) enables each cable to be terminated if the monitor is the last in the chain. High impedance inputs are teed off from the loop- through connectors to differential amplifiers TR401, TR402 and TR403, whose output is passed on via PL 403 to the Interface PCB. HF peaking is provided by adjustment of potentiometers VR401 to 403.

SYNC SEPARATOR

Analogue Green (including syncs) is also fed via emitter follower TR404 to sync separator circuits. TR405 amplifies and inverts the Green signal (with sync) and feeds it via emitter follower IC402b to pin 2 of the emitter-coupled pair IC402a, whose other base (pin 4) is biased by the resistive chain R450, R449, R448 and TR408 connected as a diode. Diode D401 lifts the bias on pin 4 when larger signals appear at pin 2. This ensures that only sync pulses are amplified by IC402a. The resulting pulses at pin 1 are amplified by TR409 to provide the sync pulse output from this circuit at the collector of TR409.

This sync pulse output from TR409 feeds four circuits.

(1)BLACK LEVEL CLAMP. A feedback loop to the base of TR405. This includes a 1us pulse generator (TR407), which produces a pulse immediately following each line sync pulse. The 1us pulse drives FET TR406 which, by clamping the black level of the signal at TR405 base, controls the bias of TR405 for varying signal levels.

The 1us pulse is also used as a black level clamp pulse for sync-on-green signals on the Interface PCB. This avoids the "green background" effect on signals with long sync pulses. The pulse is output via D414 to PL403/12. For signals other than RGB analogue inputs, normal sandcastle pulses from the Drive/Deflection PCB are switched by TR414.

(2)THE LINE SYNC MONOSTABLE. This produces sync pulses whose width is controlled by the Monostable Reset circuit. They are fed out to the sync processor on the Drive Deflection PCB via R456 and D402.

(3)MONOSTABLE RESET. IC402c, TR410 and TR411 generate a reset pulse for the line sync monostable. The pulse position varies slightly with line frequency.

This is because, for optimum performance, the sync processor IC needs sync pulses whose length is slightly shorter at high line frequencies and slightly longer at the lower end of the range.

(4)FIELD SYNC SEPARATOR. IC402d separates out the field sync pulses from the composite sync signal at its base. R475, C434, R476 and C435 form an integration network.

FIELD SYNC

TR412 amplifies the field pulses produced by IC402d and supplies them to four circuits.

(1)COMPOSITE BLANKING. Field pulses from TR412 are added to the composite sync pulses from TR409 by diodes D410 and D411. The total is fed to TR425 which generates composite blanking pulses, fed out at PL404/14.

The use of line sync pulses to initiate line blanking (in addition to the blanking derived from fly back pulses) virtually eliminates the mauve line seen with sync-on-green signals at the right hand side of the picture at high settings of the brightness control.

Diodes D412 and D413 act as a Baker clamp on TR425 to ensure fast switching and minimum "mauve line".

(2)FIELD TIMEBASE. The field pulses are fed via R458 and R459 to the field time base on the Drive Deflection PCB.

(3)SYNC PROCESSOR. The field pulses are added via diode D402 to the regenerated line pulses from the line sync monostable IC403a. These pulses feed to the sync processor IC on the Drive Deflection PCB to ensure its optimum operation.

(4)PRIORITY DETECTOR: ANALOGUE ENABLE (Fig 1, Sheet 3) The field pulses trigger monostable IC403b, whose time constant (R455, C424) is longer than the longest field (at 45Hz). Thus, so long as the field pulses continue, the monostable outputs are constant. The Q output is used as an Analogue Enable signal, and the /Q output is used as TTL/PS2 Enable.

PRIORITY DETECTOR

The Q and \Q outputs of this monostable are used to set up one of the following conditions.

(1)If sync-on-green is input to the PCB, its field sync pulses hold IC403b with outputs Q at 1 and \Q at 0. Q = 1 is output from the PCB as the Analogue Enable signal, and the analogue paths are set up for analogue RGB, analogue syncs and black level clamp.

(2)If sync-on-green is not input, Q and \Q reverse, and paths are set up for either the PS2 set of signals, or for the TTL set. The TTL Enable signal is output from the PCB when TTL is selected, but not when PS2 is selected.

ANALOGUE ENABLE, TTL ENABLE

Both these Enable signals and their complementary \Enable signals, perform a number of other switching functions, as described in the following text.

ANALOGUE ENABLE (Q output from IC403b)

When Q is 1, the following conditions exist

(1) Regenerated line pulses switch TR414 on via D423, so that the

(2) Sandcastle waveform from PL404/13 is shorted to earth.

(3) The 1us Black Clamp Drive pulses go out at PL204/12.

When Q = 0 (\Analogue Enable) The Sandcastle waveform from PL404/13 feeds out at PL404/12 as Black Clamp Drive via D415.

\ANALOGUE ENABLE

This is the \Q output from monostable IC403b, and is 0 when sync-on-green is present, and 1 when it is absent. The signal creates the following conditions.

(1)TTL Enable to PL404/3

When \Q is 0, \TTL Enable at PL404/3 is held at 0 via D419 and TR416.

When \Q is 1, TTL Enable goes out via TR416 unless the PS2/TTL switch is at PS2, in which case TR416 is held off via D418 and IC406d.

(2)PS2 RGB, Presets and Sync

When \Q is 1 and the PS2/TTL switch is at PS2,TR415 output is 1.

This sets up the following conditions.

(a) It connects PS2 RGB through IC406a,b,c.

(b) It sets TTL Enable to 0 at PL404/3 via IC406d, D418 and TR416.

(c) It connects PS2 presets via IC408.

(d) It inhibits IC405/15, so that with 3 bit code selected, the switch cannot make unwanted connections to lines in use for PS2.

(e) It gates the PS2 sync signals through AND gates IC409d.

(3)TTL

When \Q is 1 and the PS2/TTL switch is at TTL, TR415 output is 0.

This reverses all the conditions described in (2) above.

PS2-TTL SWITCH SW402

This switch sets up conditions either for a PS2 input or for a TTL input at PL401.

In the TTL position,

SW402a: Removes OV from PL401/6, enabling the Intensity signal line;

Puts OV onto the gates of FETs TR418-420 to disconnect the 75ohm terminating networks which include the PS2 RGB shunt gain controls.

Puts OV on to IC406d which opens, switching TR416 to output the TTL Enable signal.

Puts OV on to TR415 base, which opens the PS2 RGB lines (IC406a, b, c); the PS2 presets lines (IC408) and the PS2 sync lines(IC409c, IC409d).

Puts OV on to IC405/15, removing its inhibition.

SW402b: Removes OV from PL401/7, enabling 6 bit low intensity blue.

Puts OV on PL401/1 (TTL Ground).

SW402c: Removes OV from PL401/8 (TTL H. Sync).

In the PS2 position,

SW402a: Allows the FETs TR418-420 to connect the PS2 RGB 75ohm termination networks.

Allows FET TR421 to put OV on PL401/9 (Sync Ground for PS2).

Operates IC406d to inhibit the TTL Enable signal.

Allows TR415 output to connect the PS2 RGB lines via IC406, the PS2 presets via IC408, the PS2 sync lines via IC409c, d, and to inhibit IC405.

Puts 0V on PL401/6 (Red Ground).

SW402b: Removes OV from PL401/1, enabling PS2 Red.

Puts OV on PL401/7 (Green Ground).

SW402c: Puts OV on PL401/8 (Blue Ground).

TTL SELECT SWITCH SW403

This is a four position slide switch: AUTO/6 BIT/4 BIT/3 BIT, in two halves. One half provides a 1 out at PL402 if 3 BIT or 6 BIT is selected, and a 0 out if 4 BIT is selected. In the AUTO position, the 1 or 0 fed in at PL402 from the Interface Panel passes through the switch to the output, also at PL402.

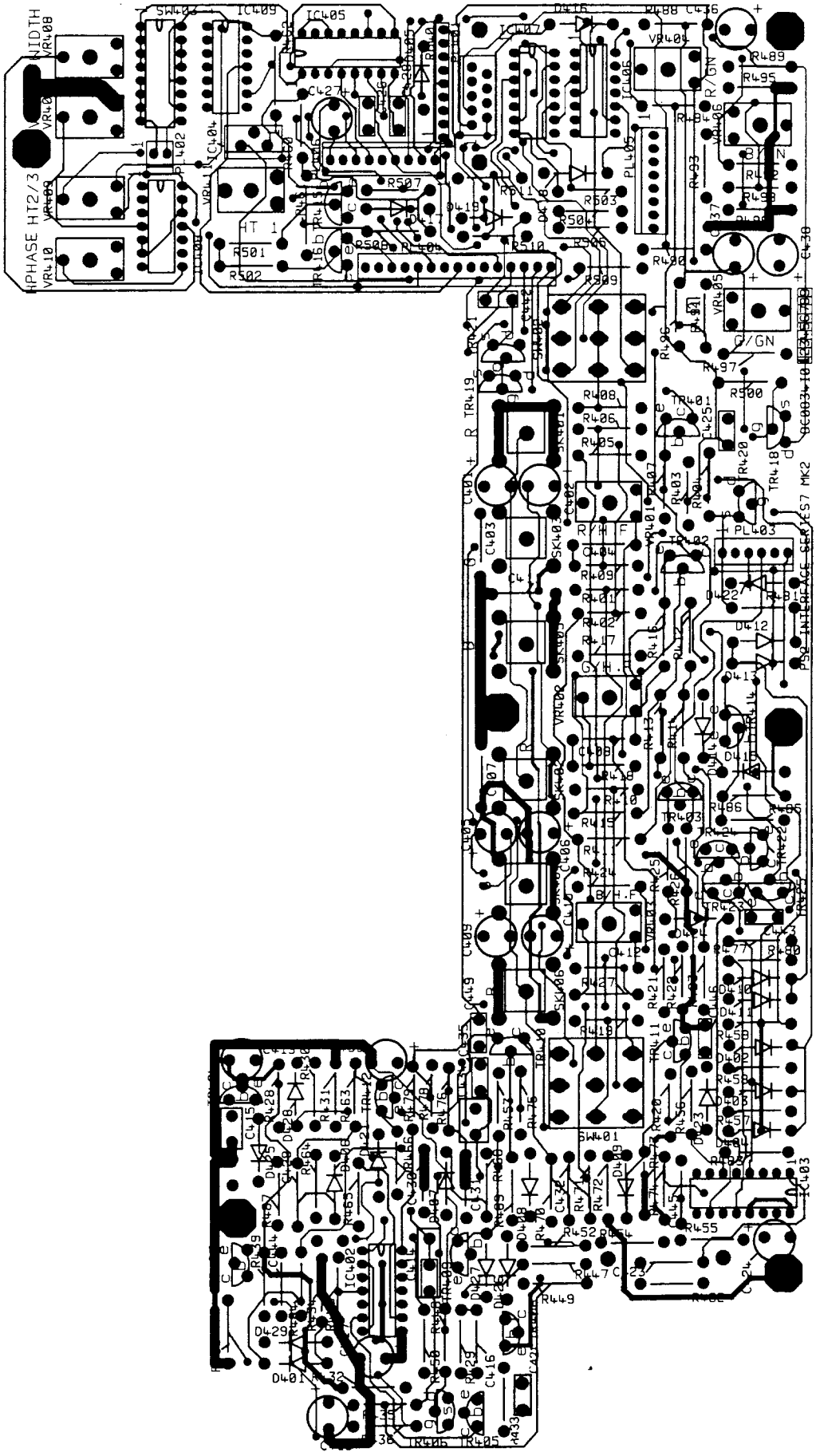
The other half of the switch controls switches in IC405. In the AUTO, 6 BIT and 4 Bit a 0 is sent to IC405, which remains unoperated. in the 3 BIT position, a 1 to IC405 operates its changeover switches. The three input bits RGB are then repeated to the 6 bit code Low Intensity RGB lines to simulate a 6 bit output at PL406. The switches in IC405 are inhibited by an input at pin 15 when the PS2/TTL switch SW402a is set to PS2 (see /Analogue Enable, para 2d).

OUTPUTS

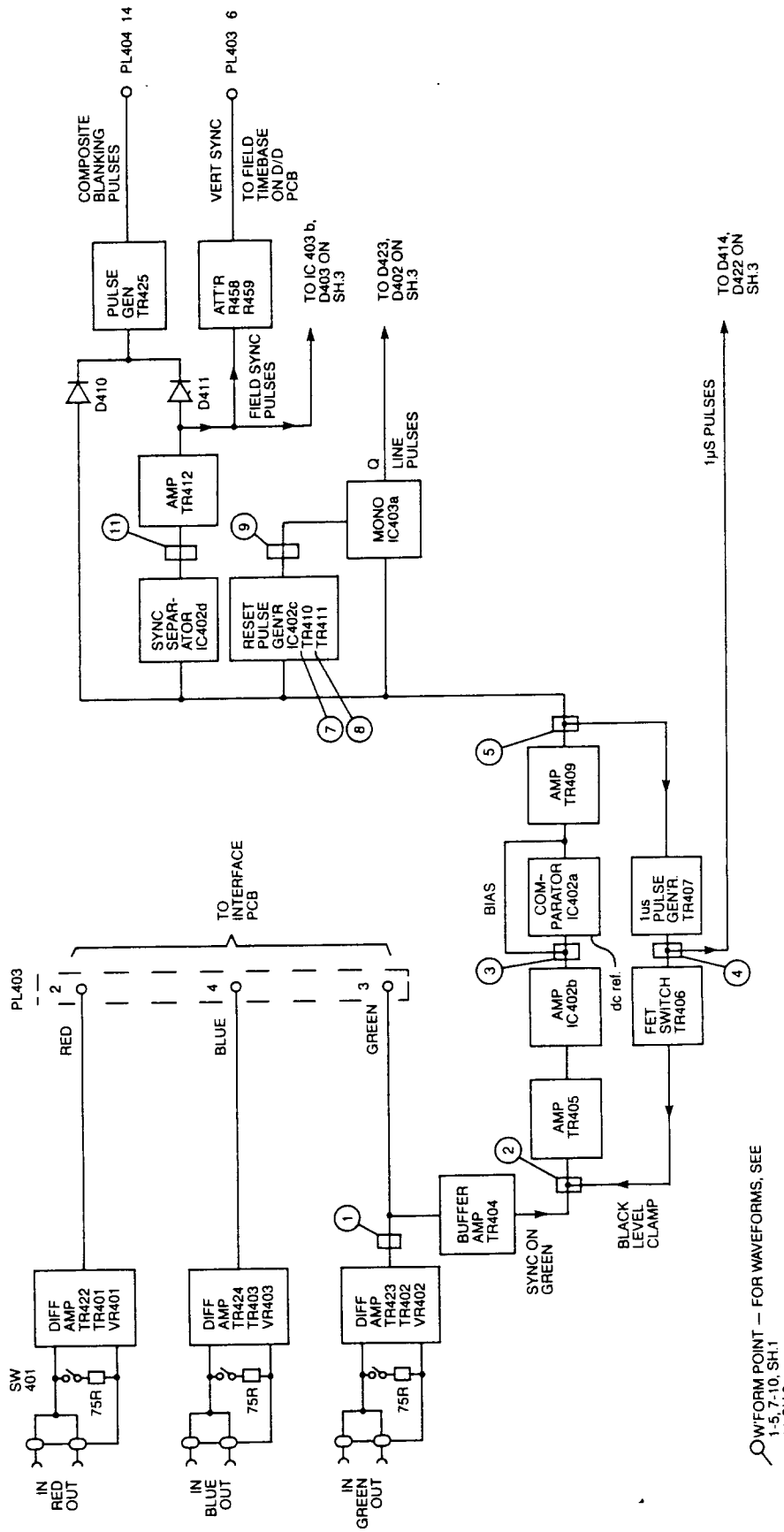
With a TTL input at PL401, the corresponding bit-code selected at TTL SELECT switch SW403, and TTL selected at SW402, output is at PL406, as shown.

With a PS2 input, and PS2 selected at SW402, output is at PL404 and PL405, as shown.

	TTL OUTPUT				PS2 OUTPUT	
PL406	6 Bit	4 Bit	3 Bit		PL404	PL405
1	H Sync	H Sync	H Sync	H Sync	9	
2	V Sync	V Sync	V Sync	V Sync	8	
3	B	B	B	B		
4	G	G	G	G		4
5	R	R	R	R		2
6	LoR	-	R	OV		1
7	LoG	INT	G	OV		3
8	LoB	-	B	OV		5
9	OV	OV	OV	OV		7

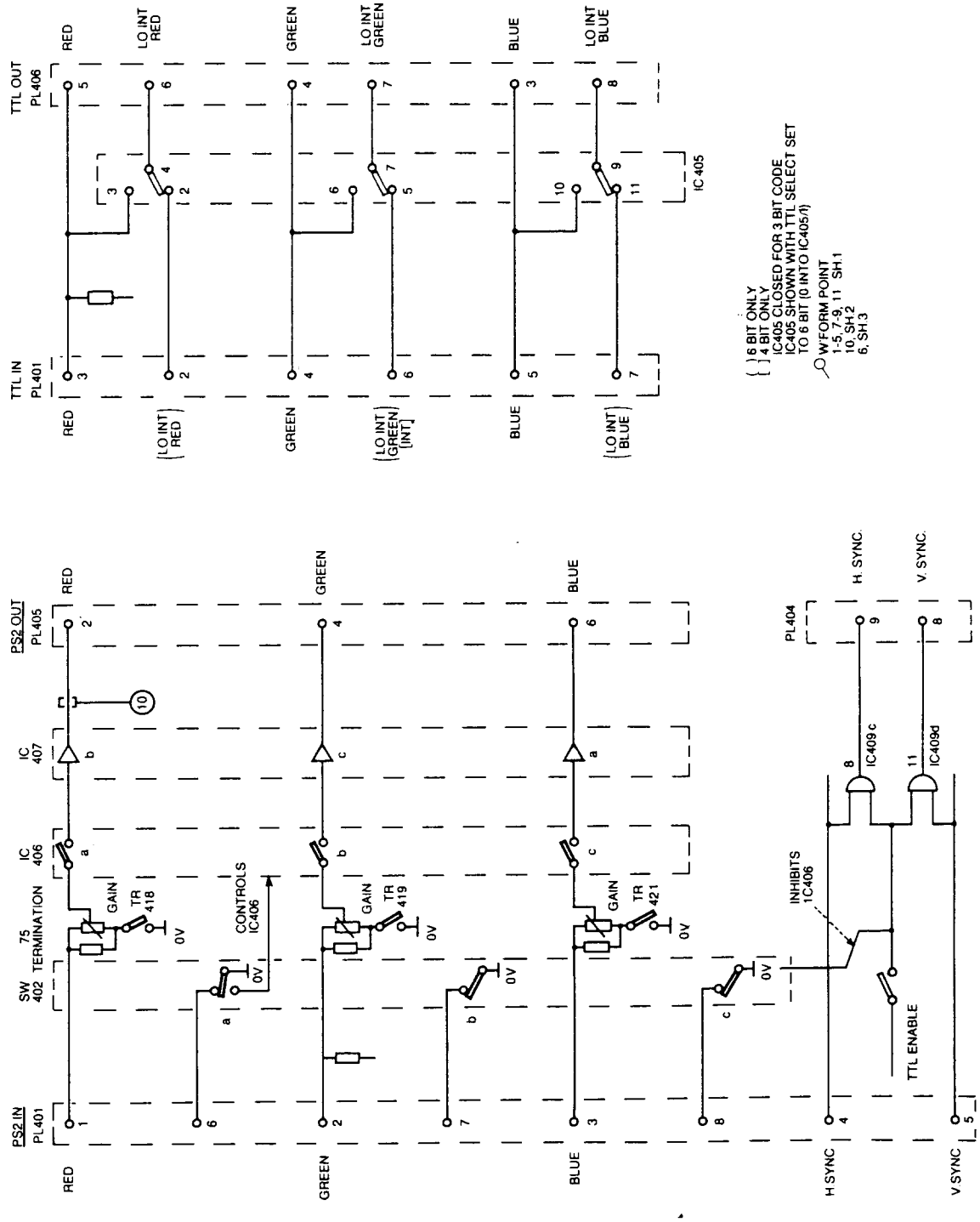


PS2/PCB TRACK AND IDENT



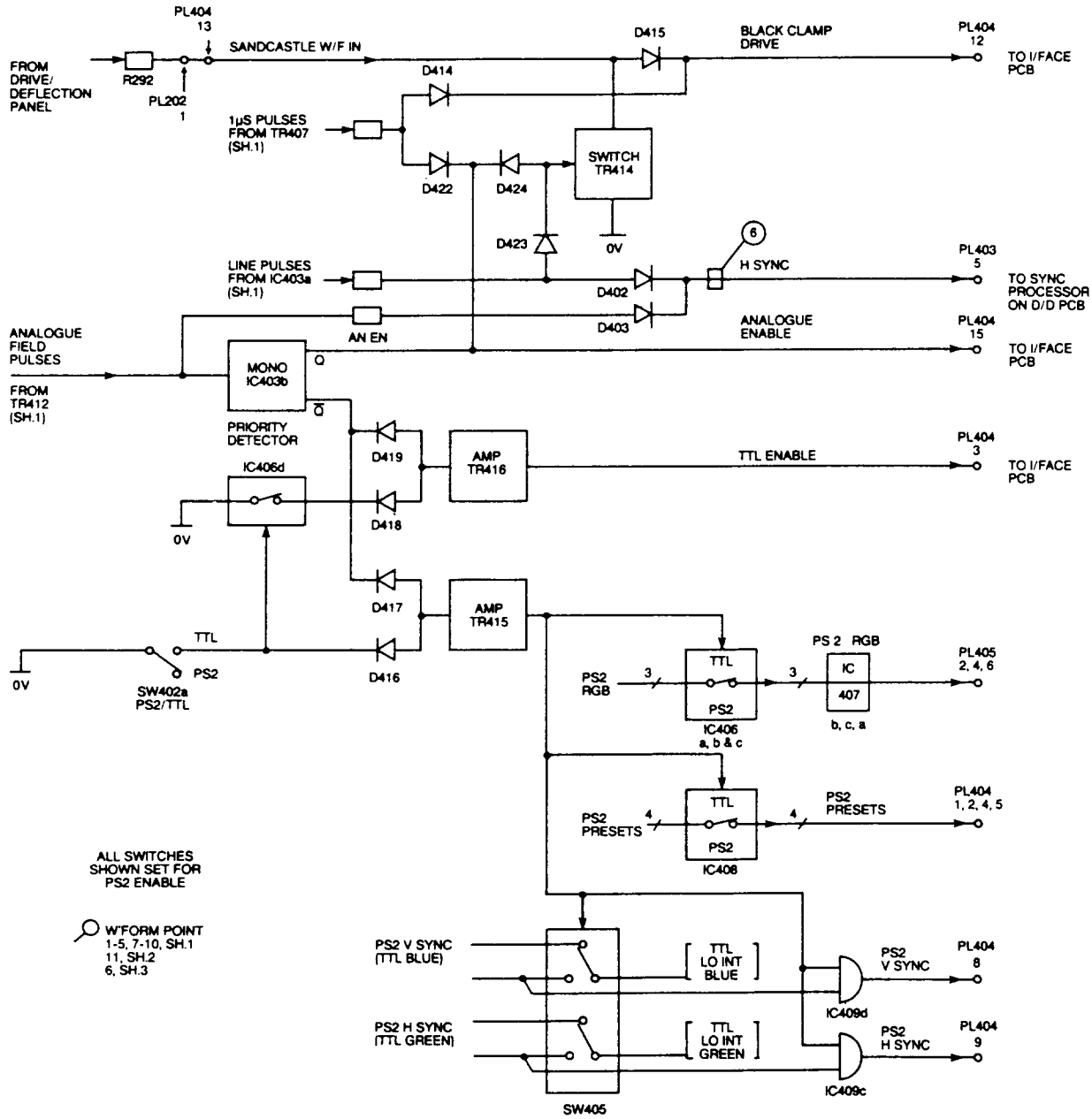
PS2 DIFFERENTIAL INPUT PCB BLOCK DIAGRAM ANALOGUE PATH, SYNC SEPARATION

FIG. 1



PS2 DIFFERENTIAL INPUT PCB : BLOCK DIAGRAM
PS2 & TTL SIGNAL PATHS

FIG. 2



PS2 DIFFERENTIAL INPUT PCB : BLOCK DIAGRAM
ANALOGUE/TTL/PS2 ENABLE SIGNALS

FIG. 3

SERIES 7 MK2: PS2/DIFFERENTIAL INPUT PCB:COMPONENTS LIST

COMPONENTS LIST

A Components List is given for one PCB, under its Assembly num ber. A list of differences is given for each variant of that PCB, under its own Assembly number.

The appropriate Assembly number for a PCB in a particular model may be found by reference to Table 1 in the Introduction to this Manual.

In the Coponents Lists, the following abbreviations are used.

RESISTORS	CAPACITORS
CC Carbon Composition	AE Aluminium Electrolytic
CF Carbon Film	C Ceramic
MF Metallised Film	CT Ceramic Tube
MO Metal Oxide	MP Metallised Polymer
TH Thermistor	PC Poly Carbonate
WW Wire Wound	PS Polystyrene
	T Tantalum

PTC Positive Temperature Coefficient.

PS2 DIFFERENTIAL INPUT PCB AO3671, AO3859.

RESISTORS

Circuit Reference	Component Reference	Component Description
R401,410,419	RF821 DJO	82R 1/4W 5% CF
R402,411,420, 438,439,463	RF223 DJO	2K2 1/4W 5% CF
R403,412,421, 434,436	RF393 DJO	3K3 1/4W 5% CF
R404,413,422, 485,495,497,499	RF563 DJO	5K6 1/4W 5% CF
R405,406,414,415, 423,424,447	RF471 DJO	47R 1/4W 5% CF
R407,416,425	RF102 DJO	100R 1/4W 5% CF
R408,417,426	RF122 DJO	120R 1/4W 5% CF
R409,418,427	RF221 DJO	22R 1/4W 5% CF
R428,459,466,470, 478,510,511	RF104 DJO	10K 1/4W 5% CF

SERIES 7 MK2: PS2/DIFFERENTIAL INPUT PCB:COMPONENTS LIST

RESISTORS

Circuit Reference	Component Reference	Component Description
R429,443,452,465,	RF103 DJO	1K 1/4W 5% CF
471,474,482,487,507		
R430	RF332 DJO	330R 1/4W 5% CF
R431,488,490,492	RF222 DJO	220R 1/4W 5% CF
R432	RM682 DHO	680R 1/4W 1% MF
R433	RM104 DHO	10K 1/4W 1% MF
R435	RF334 DJO	33K 1/4W 5% CF
R437	Not fitted	
R440-442	Not fitted	
R448	RM122 DHO	120R 1/4W 1% MF
R449	RM823 DHO	8K2 1/4W 1% MF
R450	RM223 DHO	2K2 1/4W 1% MF
R451	Not fitted	
R453,508	RF472 DJO	470R 1/4W 5% CF
R454	RF105 DJO	100K 1/4W 5% CF
R455	RF225 DJO	220K 1/4W 5% CF
R456,457,458	RF153 DJO	1K5 1/4W 5% CF
R460	RM101 HHO	10R 0.6W 1% MF
R461	RL101 GJO	10R 1/2W 5% FF
R462	RM181 9JO	18R 1.6W 5% MF
R464,472,473,486,500	RF224 DJO	22K 1/4W 5% CF
R467	Not fitted	
R468,501,502,509	RF473 DJO	4K7 1/4W 5% CF
R469	RF124 DJO	12K 1/4W 5% CF
R475,476	RF823 DJO	8K2 1/4W 5% CF
R477,480,494,498	RF223 DJO	2K2 1/4W 5% CF
R479	RF154 DJO	15K 1/4W 5% CF
R481	RF682 DJO	680R 1/4W 5% CF
R483	RF683 DJO	6K8 1/4W 5% CF
R484	RF333 DJO	3K3 1/4W 5% CF
R489,491,493	RF181 DJO	18R 1/4W 5% CF
R503,504,505	RF391 DJO	39R 1/4W 5% CF
R506	Not fitted	

SERIES 7 MK2: PS2/DIFFERENTIAL INPUT PCB:COMPONENTS LIST

RESISTORS

Circuit Reference	Component Reference	Component Description
RU401	RN008 BJ5	1K

CAPACITORS

C401,402,405,406,	CA108 FM7	100u 25V AE
409,410,417,427,433		
C403,407,411,416	CK271 JJO	27p 50V CT
C404,408,412	CK103 JKO	1n 50V CT
C413	CA107 JL7	10u 50V 20% AE
C414	CM225 KK9	220n 100V 10% MP
C415,425,426,428,	CM105 8K6	100n 63V 10% MP
442,443,446		
C418	Not fitted	
C419	CA227 FM7	22u 25V AE
C420	Not fitted	
C421	CD104 8K6	10n 63V 10% CD
C422	Not fitted	
C423	CK102 JJO	100p 50V 5% CT
C424	CA106 JL7	1u 50V 20% AE
C429	CK682 JKO	680p 50V 10% CT
C430	CK104 FLO	10n 25V 20% CT
C431	CK332 JKO	330p 50V 10% CT
C432	CK222 JKO	220p 50V 10% CT
C434	CM475 8K6	470n 63V 10% MP
C435	CM224 8K6	22n 63V 10% MP
C436,437,438	CA107 EL2	10u 16V 20% AE
C439,440,441	Not fitted	
C444	CK681 JJO	68p 50V 5% CT
C445	CK223 JKO	2n2 50V 10% CT

SERIES 7 MK2: PS2/DIFFERENTIAL INPUT PCB:COMPONENTS LIST

DIODES

Circuit Reference	Component Reference	Component Description
D401-403,406-419, 421-429	DS4148 UTO	1N4148
D404	DZ7943 OFBO	Zener BZX79B4V3 2%
D405	DZ6151 OJCO	Zener BZX61C5V1 5%

TRANSISTORS

TR401-403,407,409, 412	QS4125 UU5	2N4125
TR404,405,408	QS0307 UU5	BC307-5
TR406	QF0111 UK1	J111 FET
TR410,411,422-425	QS4123 UUO	2N4123
TR413		
TR414-416	QS0237 UUO	BC237-P
TR417		
TR418-421	QE7000 UUO	2N7000 FET

INTEGRATED CIRCUITS

IC401		
IC402,407	IA3046 UU2	CA3046 Transistor Array
IC403	IG4528 BUU2	4528B
IC404	IV0340 UU3	LM340T12 12V1A
IC405	IT4157 MX2	74L2157N
IC406,408	IG4066 UUU	4066 Quad Multiplexer
IC409	IT7426 MU2	74LS26

POTENTIOMETERS

VR401-406	RQ102 AL2	100R Preset
VR407,409-411	RQ104 AL2	10K Preset
VR408	RQ473 AL2	4K7 Preset

SERIES 7 MK2: PS2/DIFFERENTIAL INPUT PCB:COMPONENTS LIST

PS2 / DIFFERENTIAL INPUT PCB AO4101.

The Components List is as for AO3859, with the following exceptions.

RESISTORS

Circuit Reference	Component Reference	Component Description
R439	RF822 DJO	820R 1/4W 5% CF
R482	RF332 DJO	330R 1/4W 5% CF
R484	RF153 DJO	1K5 1/4W 5% CF
R486	RF225 DJO	220K 1/4W 5% CF

CAPACITORS

C403,407,411	WL6300 TU1	Wire Link
C444	CK471 JJO	47p 50V 5% CT
C446	CL013 JKO	1n 50V CT

TRANSISTORS

TR414	QE7000 UUO	2N7000 FET

SERIES 7 MK 2 : BNC LOOP THROUGH PCB

GENERAL

This PCB has two sets of BNC connectors allowing signal input and loop through. The signals are R, G, B and composite sync. A 9 way 'D' type connector for analogue input is also incorporated.

INPUT FACLITIES

In its standard format, models in this series incorporate facilities for both TTL and Analogue RGB Inputs. The type of input sockets and their arrangement may vary according to the individual model's specification.

ELECTRICAL CONNECTIONS/INTERCONNECTIONS

Electrical connections to the BNC loop through panel are given in the Interconnections diagram.

CIRCUIT DESCRIPTIONS

The circuit descriptions should be read in conjunction with the following:

BNC Loop Through Circuit Diagram

Drawing number GO 1800

Series 7 MK 2 Interconnection Diagram (20 inch models)

Drawing number GO XXXX

CIRCUIT DESCRIPTIONS

RGB INPUTS

RGB inputs can be applied using either the BNC connectors or the 9 way 'D' type connector. The circuits for the R, G and B inputs are identical and for the purpose of this description only the R channel input will be considered.

The input signal is applied to the junction of C401 and R401. If loop through has been selected SW401 will be open. SW401 can be used to terminate the line via the 75 ohm resistor R401.

The signal is decoupled by C401 and passed to the emitter follower circuit comprising of R402, R403, R404, TR401 and R405. The output signal is taken from the emitter of TR401 and appears on PL402 pin 3.

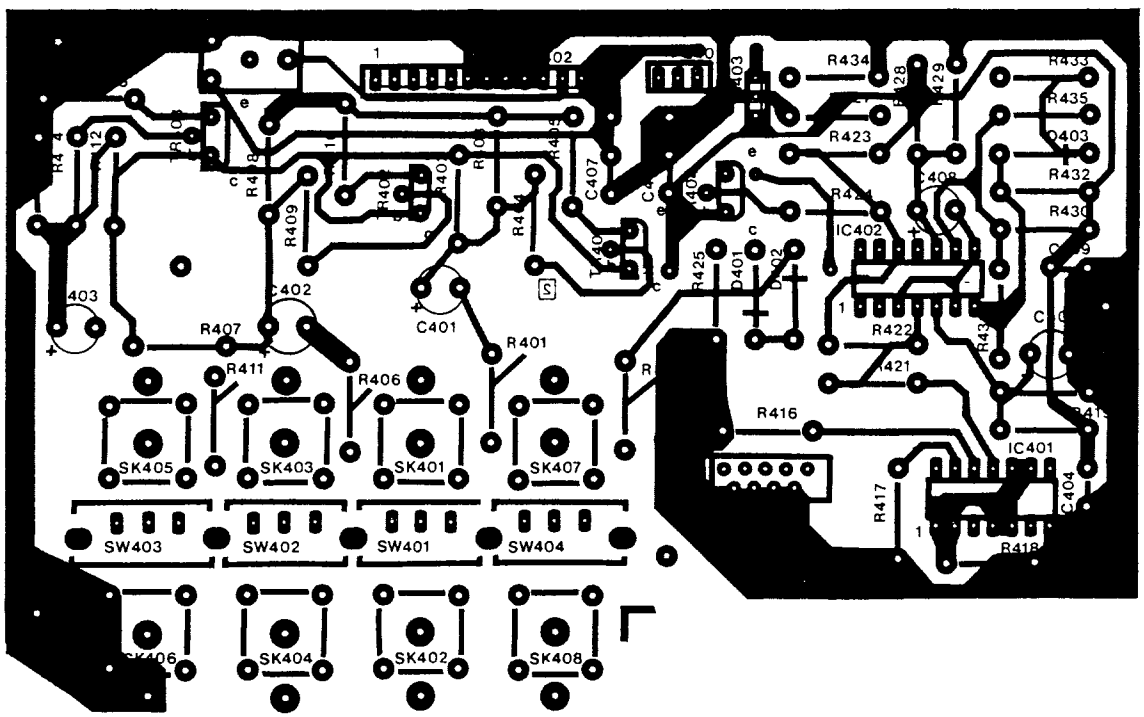
ANALOGUE INPUT - HORIZONTAL AND VERTICAL SYNC

With Analogue input horizontal sync and vertical sync signals are passed to IC401 pins 12 and 13 respectively. IC401 is an EXCLUSIVE OR gate, which combines the two sync inputs resulting in a mixed sync output.

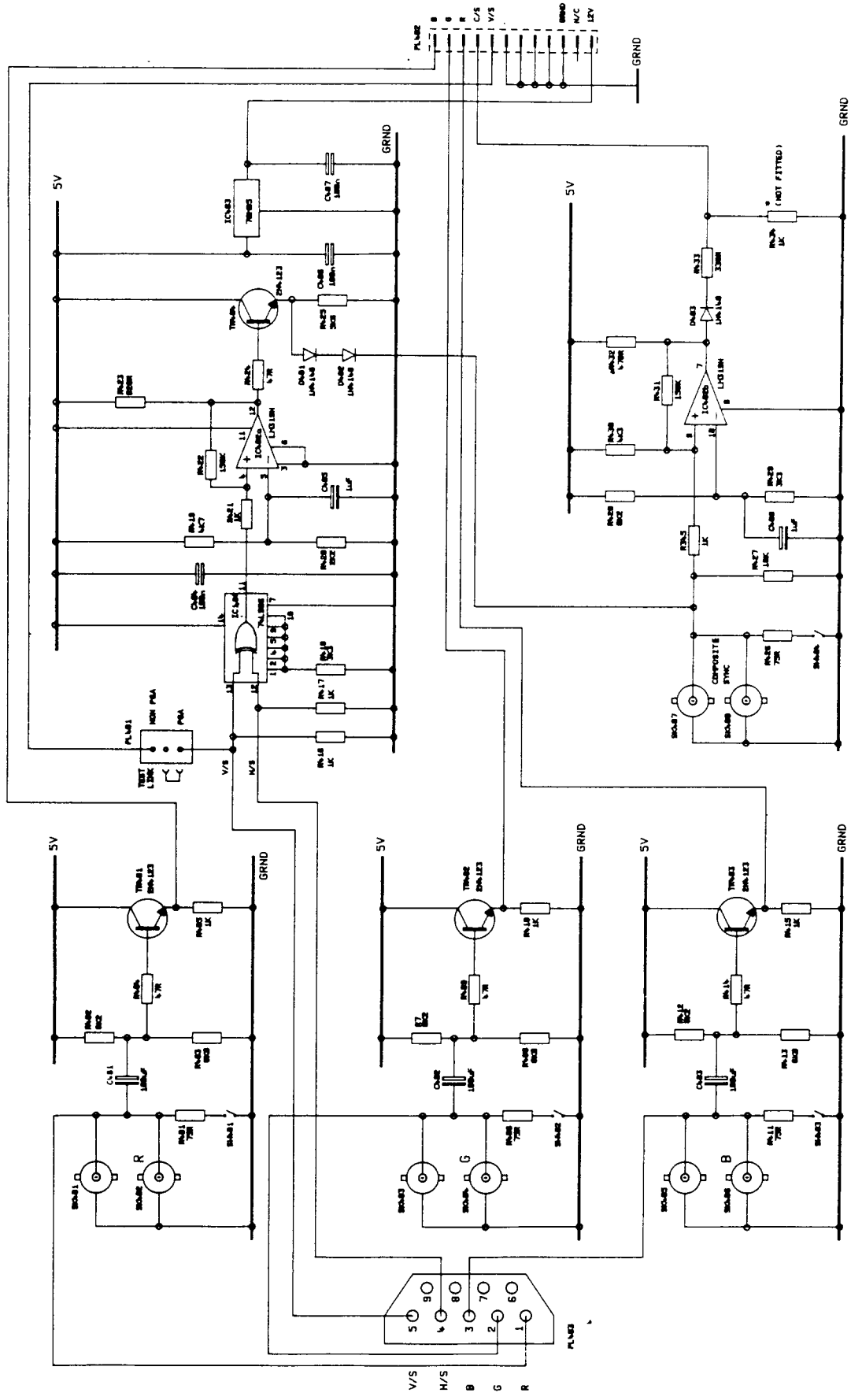
The output from IC401 feeds the non-inverting terminal (pin 4) of IC402a. IC402a acts as a buffer which switches its output (pin 12) high when the output from IC401 is high and low (0V) otherwise. The output from IC402a feeds the base of TR404, which switches ON when pin 12 IC402a is high. The emitter from TR404 is connected to the composite sync BNC input via diodes D401 and D402, thus providing a TTL mixed level sync at the BNC for loop through.

TTL level mixed sync can be applied to the BNC inputs. The signal is buffered by IC402b and fed to the main interface via PL402.

SERIES 7 MK 2 : BNC LOOP THROUGH PCB



SERIES 7 MK 2 : BNC LOOP THROUGH PCB



20" BNC LOOP THROUGH PANEL CIRCUIT DIAGRAM

SERIES 7 MK2: BNC LOOP THROUGH PCB: COMPONENTS LIST

COMPONENTS LIST

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CF Carbon Film	C Ceramic
MF Metallised Film	CT Ceramic Tube
MO Metal Oxide	MP Metallised Polymer
TH Thermistor	PC Poly Carbonate
WW Wire Wound	PS Polystyrene
	T Tantalum

PTC Positive Temperature Coefficient.

BNC LOOP THROUGH PCB AO4540.

RESISTORS

Circuit Reference	Component Reference	Component Description
R401, 406, 411, 426	RF751 DJO	75R 1/4W 5% CF
R402, 407, 412	RF823 DJO	8K2 1/4W 5% CF
R403, 408, 413	RF683 DJO	6K8 1/4W 5% CF
R404, 409, 414, 424	RF471 DJO	47R 1/4W 5% CF
R405, 410, 415-417, 421, 435	RF103 DJO	1K0 1/4W 5% CF
R418, 429	RF333 DJO	3K3 1/4W 5% CF
R419	RM473 DHO	4K7 1/4W 1% MF
R420	RM223 DHO	2K21 1/4W 1% MF
R422, 431	RF155 DJO	150K 1/4W 5% CF
R423	RF822 DJO	820R 1/4W 5% CF
R425	RF563 DJO	5K6 1/4W 5% CF
R427	RF104 DJO	10K 1/4W 5% MF
R428	RM823 DHO	8K2 1/4W 1% MF
R430	RM433 DHO	4K3 1/2W 1% MF

SERIES 7 MK2: BNC LOOP THROUGH PCB: COMPONENTS LIST

RESISTORS

Circuit Reference	Component Reference	Component Description
R432	RF472 DJO	470R 1/4W 5% CF
R433	RK332 DJO	330R 1/4W 5% CF

CAPACITORS

Circuit Reference	Component Reference	Component Description
C401-403	CA108 FM7	100u 25V AE
C404, 406, 407, 409	CM105 8K6	100n 63V 10% MP
C405, 408	CA106 JL7	1u0 50V 20% AE

DIODES

D401-403	DS4148 UTO	IN4148

TRANSISTORS

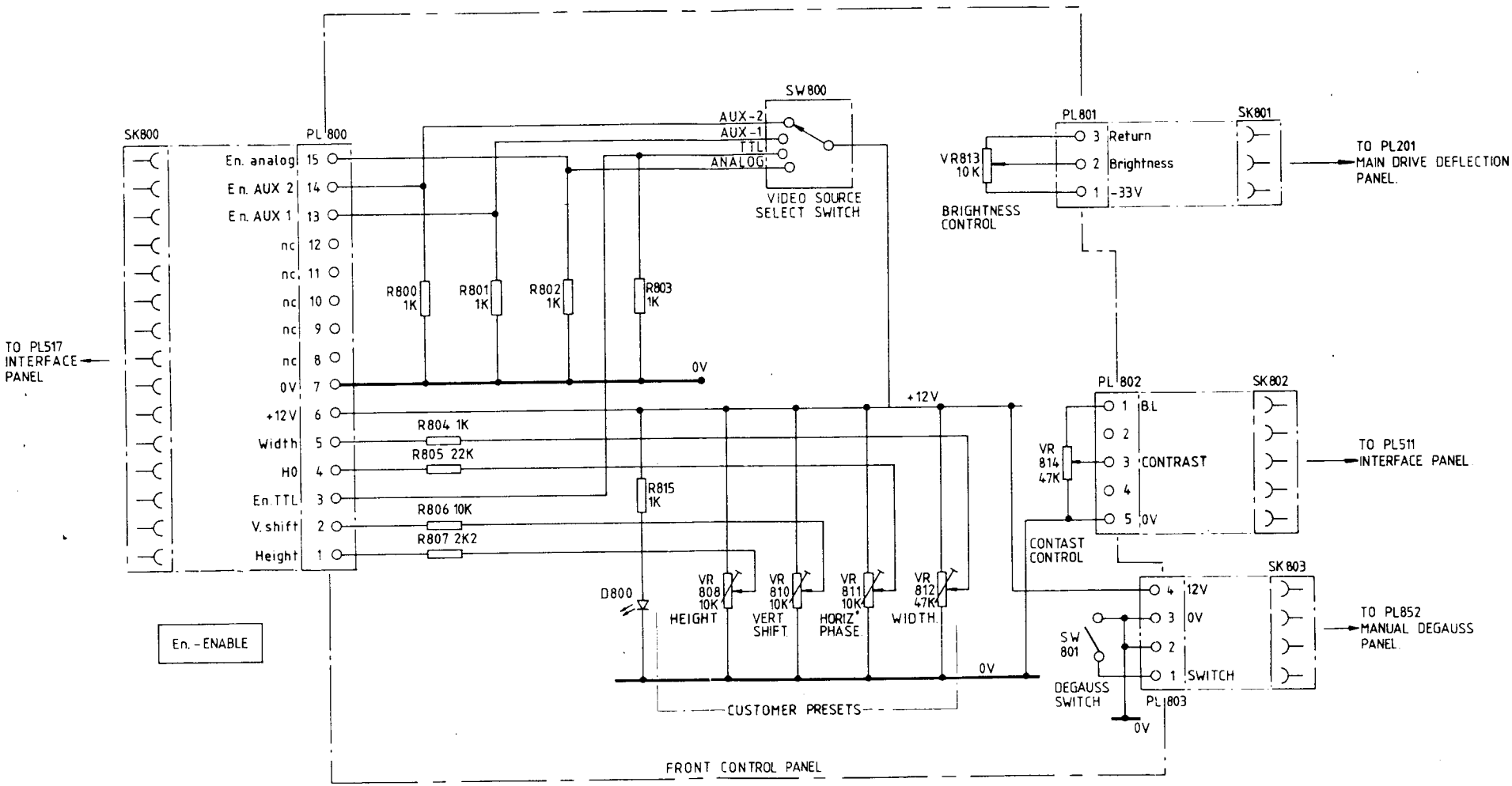
TR401-404	QS4123 UU0	2N4123

INTEGRATED CIRCUITS

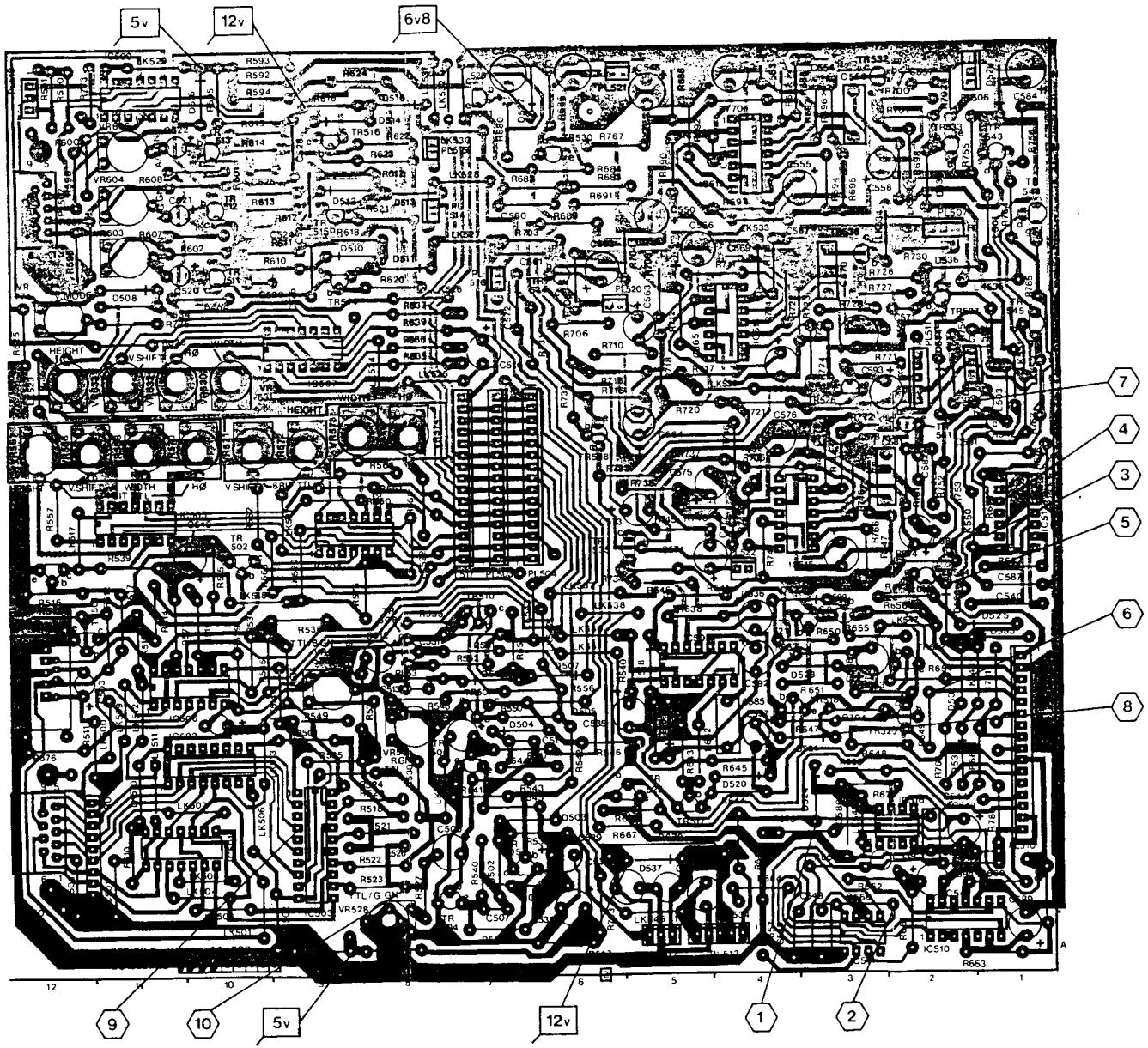
IC401	IT7486MX2	AN74LS86N
IC402	IL0319UU2	LM319N
IC403	IV7805MM3	78M05 VOLT. REG.

PLUGS AND SOCKETS

PL401	KP0024A03	3 WAY 20/3423 PRESSAC
PL402	KP0026A12	12 WAY PCB LOCK

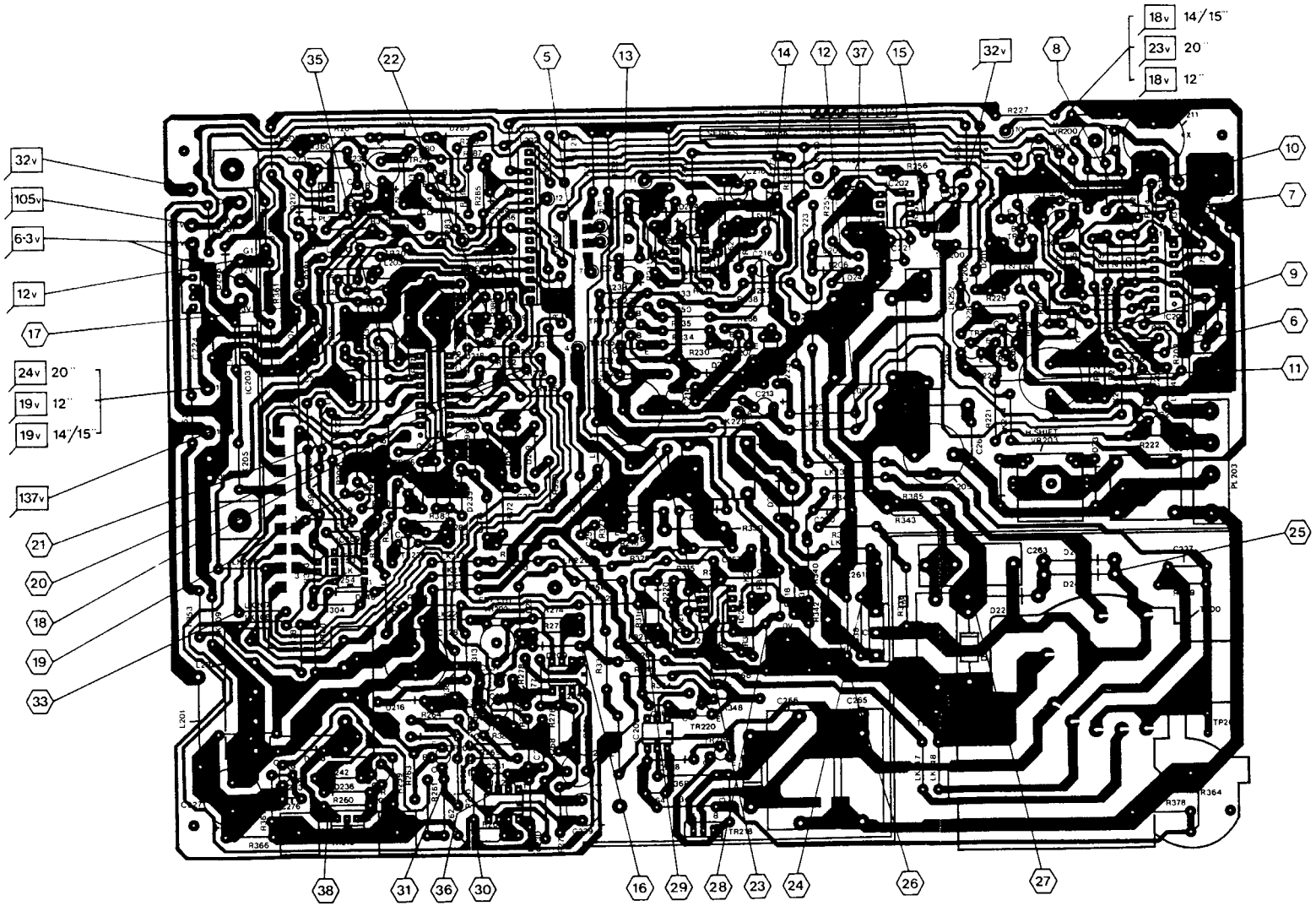


USER CONTROLS 20" MODELS
Drg. No. GO1165 (Sht 1 of 1)



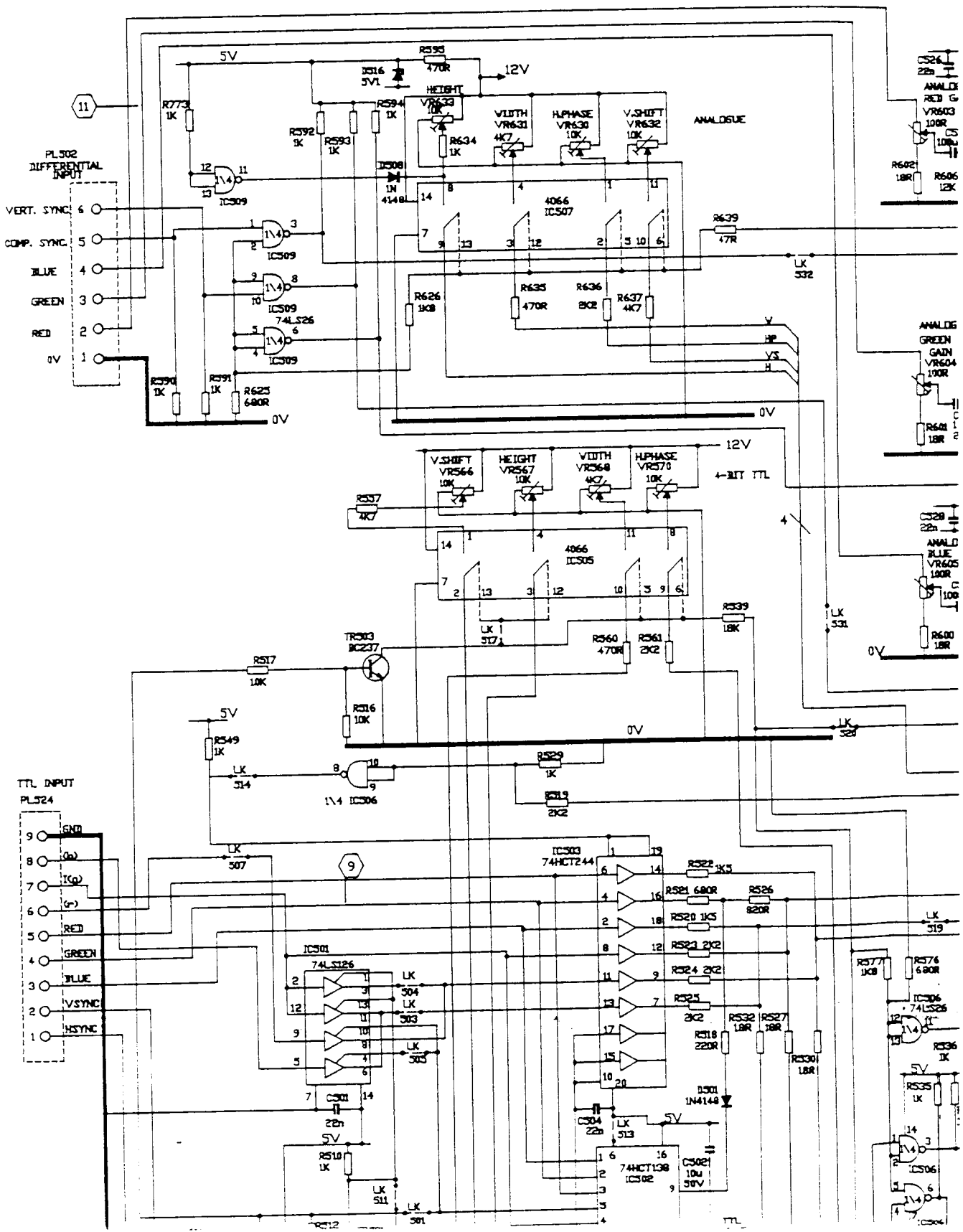
Notes
1 Track (Bottom Side) is shown 'viewed through the board.'
2 Symbol ◯ denotes waveform measurement point.
3 Symbol ▭ denotes voltage measurement point.

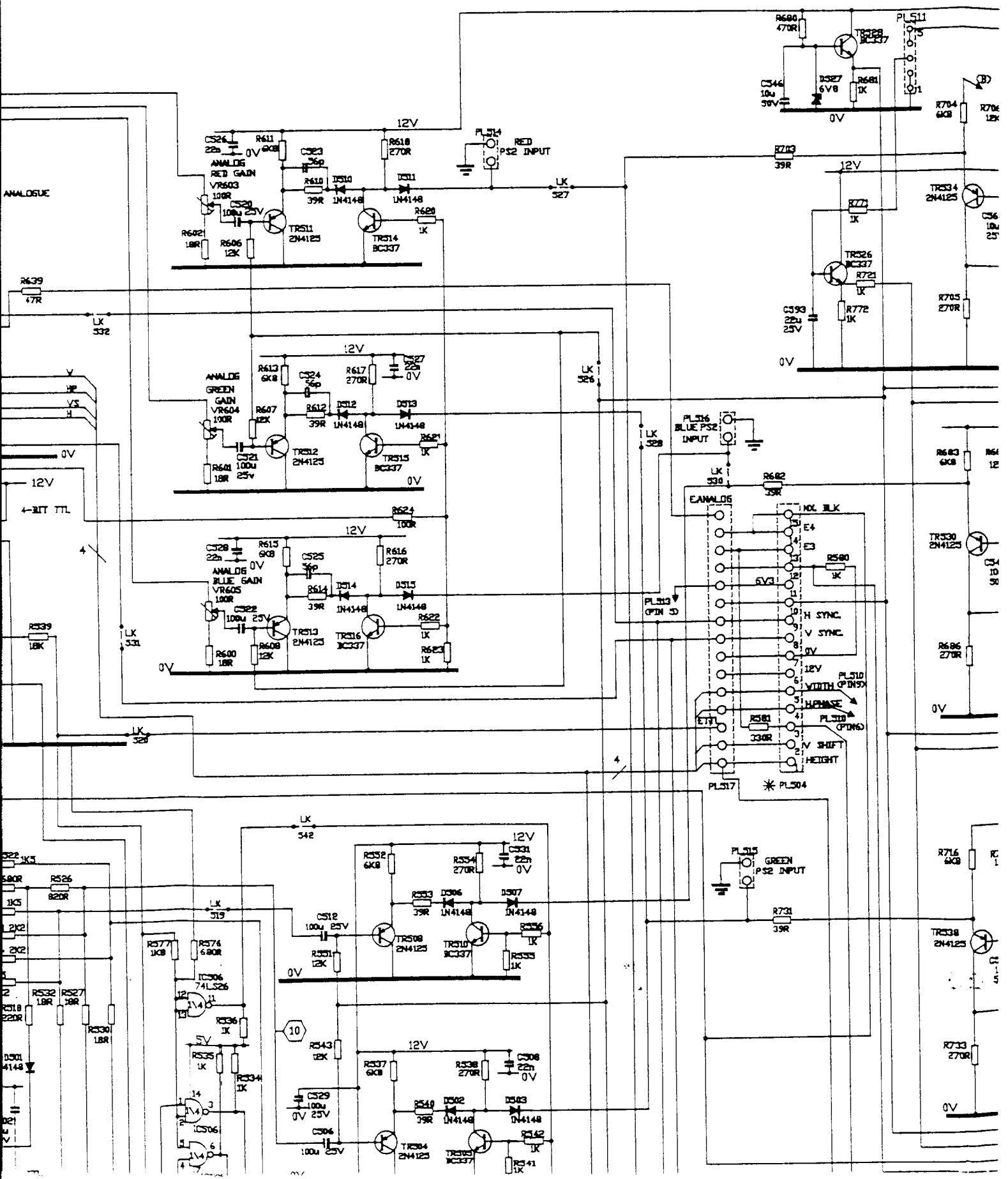
SERIES 7 INTERFACE PCB LAYOUT DIAGRAM

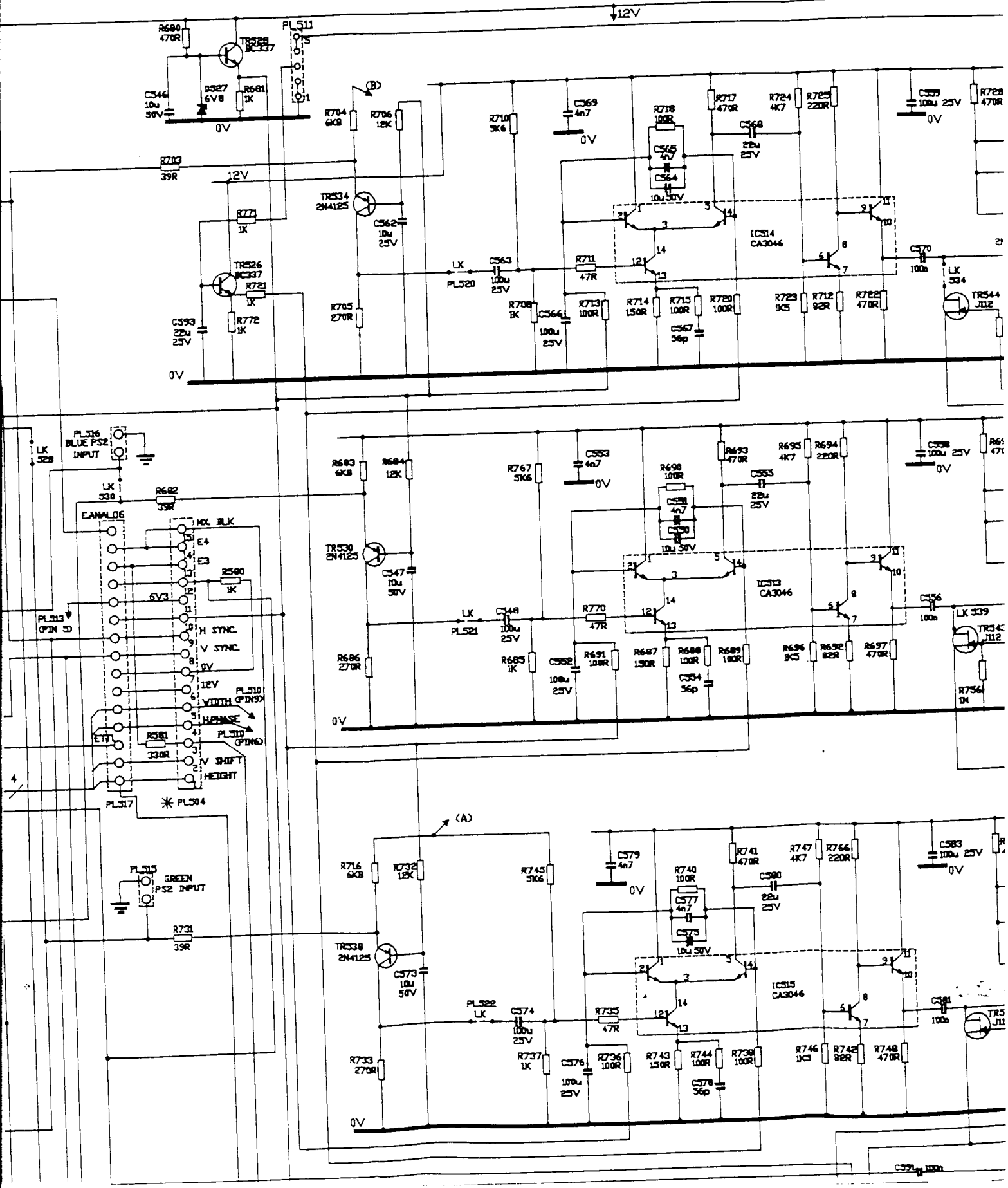


Notes
1 Track (Bottom Side) is shown 'viewed through the board.'
2 Symbol ⬡ denotes waveform measurement point.
3 Symbol ▭ denotes voltage measurement point.
4 All measurement points denoted refer to: Series 7 Mk2 Drive/Deflection PCB Assembly Circuit Diagram.

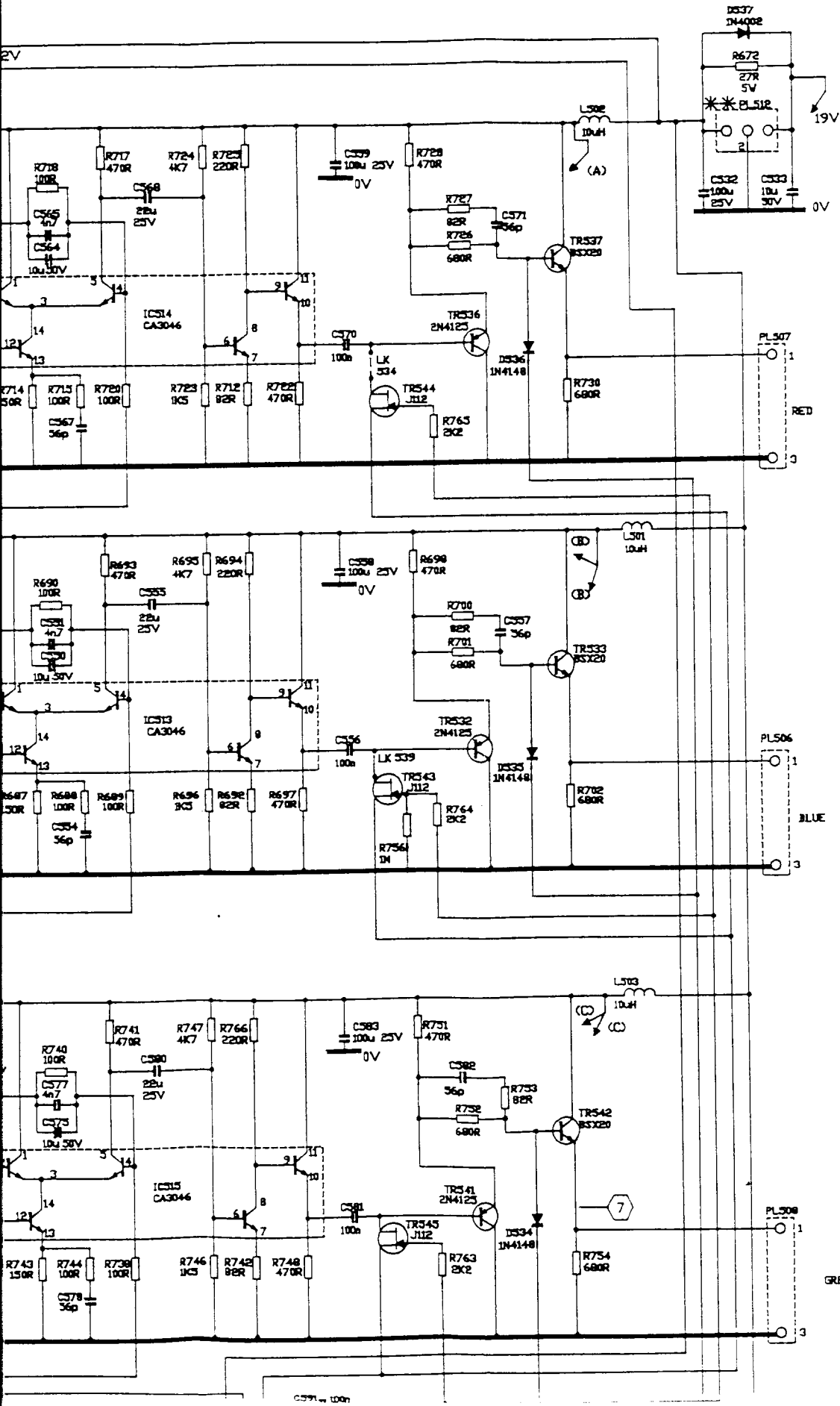
DRIVE/DEFLECTION PCB LAYOUT

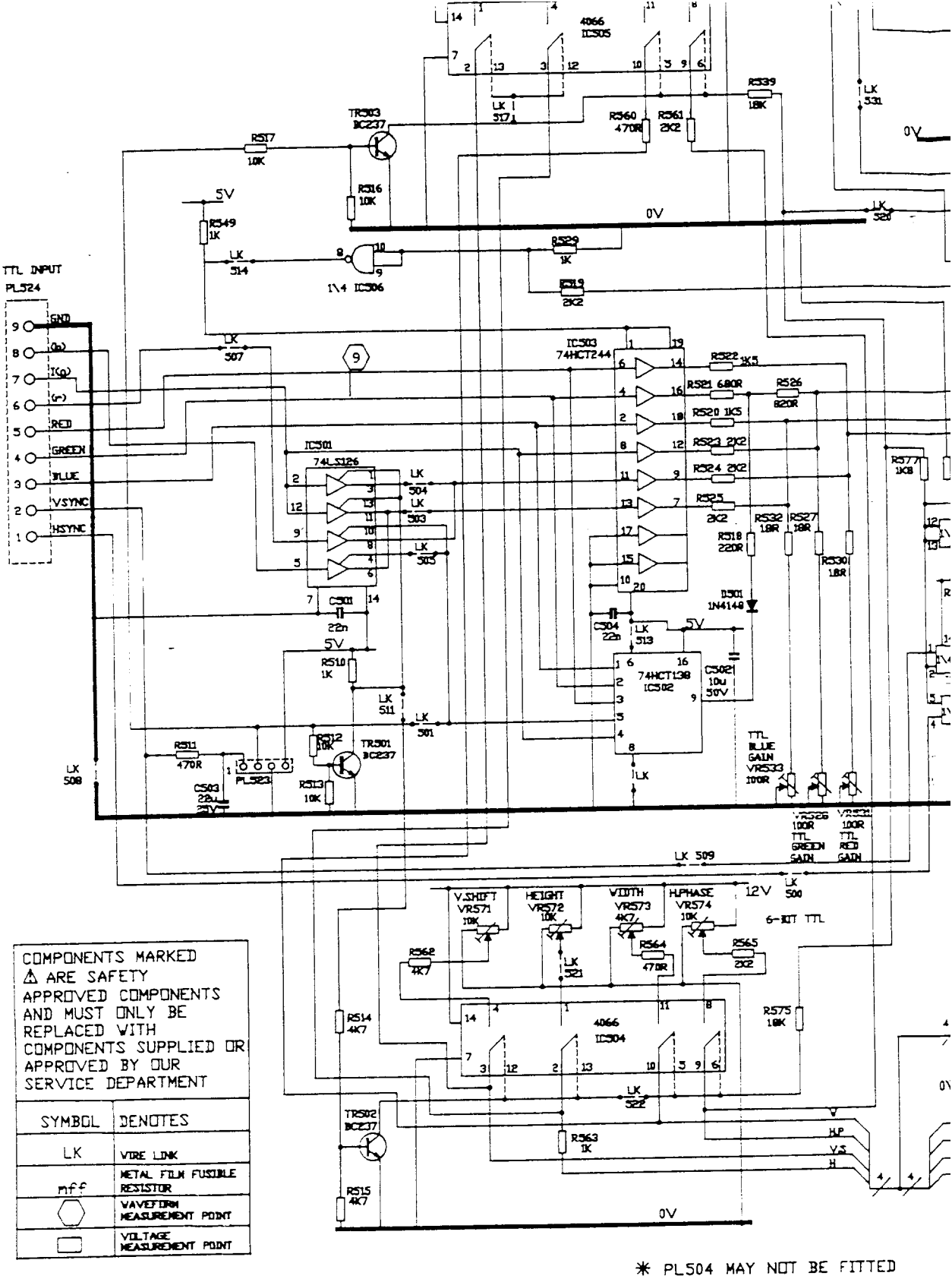

PL502
DIFFERENTIAL
INPUT
VERT. SYNC
COMP. SYNC.
BLUE
GREEN
RED
0V
5V
12V
ANALOGUE
HEIGHT
VR633
WIDTH
VR631
H.PHASE
VR630
V.SHIFT
VR632
4066
IC507
IC509
74LS26
R595
470R
R594
1K
R592
1K
R593
1K
R773
1K
R634
1K
R639
47R
R626
1K8
R635
470R
R636
2K2
R637
4K7
R625
680R
R590
1K
R591
1K
LK
532
ANALOG
GREEN
GAIN
VR604
100R
R601
18R
V.SHIFT
VR566
HEIGHT
VR567
WIDTH
VR568
H.PHASE
VR570
4-BIT TTL
4066
IC505
R557
4K7
R539
18K
LK
531
ANALO
BLUE
VR605
100R
R600
18R
TR503
BC237
R517
10K
R516
10K
R549
1K
LK
514
1\4 IC506
R529
1K
R519
2K2
LK
520
TTL INPUT
PL524
GND
(b)
I(g)
(r)
RED
GREEN
BLUE
VSYNC
HSYNC
LK
507
IC503
74HCT244
R522 1K5
R521 680R
R526
820R
R520 1K5
R523 2K2
R524 2K2
R525
2K2
R532
18R
R527
18R
R518
220R
R530
18R
LK
519
R577
1K8
R576
680R
IC506
74LS26
R536
1K
R535
1K
IC501
74LS126
LK
504
LK
503
LK
505
C501
22n
R510
1K
LK
511
LK
501
D501
1N4148
C504
22n
LK
513
74HCT138
IC502
C502
10u
50V
IC506
IC506


ANALOGUE
R639 47R
LK 332
V
HP
VS
H
0V
12V
4-BIT TTL
4
R624 100R
R539 18K
LK 331
LK 329
LK 342
LK 519
R526 820R
1K5
2K2
R532 18R
R527 18R
R530 18R
R536 1K
R535 1K
R534 1K
5V
IC506 74LS26
R577 1K8
R576 680R
R543 12K
10
R551 12K
C512 100u 25V
C506 100u 25V
C529 100u 25V
R541 1K
R542 1K
TR504 2N4125
TR505 BC337
TR508 2N4125
TR510 BC337
D501 1N4148
D502 1N4148
D503 1N4148
D506 1N4148
D507 1N4148
R537 6K8
R538 270R
R540 39R
R552 6K8
R554 270R
R553 39R
R556 1K
R555 1K
C508 22n
C531 22n
C526 22n
R611 6K8
R618 270R
C523 56p
R610 39R
D510 1N4148
D511 1N4148
C520 100u 25V
R602 18R
R606 12K
TR511 2N4125
TR514 BC337
R620 1K
ANALOG RED GAIN VR603 100R
PL514 RED PS2 INPUT
LK 527
C527 22n
R613 6K8
R617 270R
C524 56p
R612 39R
D512 1N4148
D513 1N4148
C521 100u 25v
R601 18R
R607 12K
TR512 2N4125
TR515 BC337
R621 1K
ANALOG GREEN GAIN VR604 100R
LK 326
C528 22n
R615 6K8
R616 270R
C525 56p
R614 39R
D514 1N4148
D515 1N4148
C522 100u 25V
R600 18R
R608 12K
TR513 2N4125
TR516 BC337
R622 1K
R623 1K
ANALOG BLUE GAIN VR605 100R
LK 328
PL516 BLUE PS2 INPUT
LK 330
R682 39R
E ANALOG
HOL BLK
E4
E3
5V3
H SYNC.
V SYNC.
0V
12V
PL510 (PIN9)
WIDTH
H PHASE
PL510 (PIN6)
E TTL
R581 330R
V SHIFT
HEIGHT
PL517
PL504
PL513 (PIN 5)
R580 1K
PL515 GREEN PS2 INPUT
R731 39R
R680 470R
TR528 BC337
D527 6V8
R681 1K
C546 10u 35V
PL511
R703 39R
R704 6K8
R705 270R
R706 12K
TR534 2N4125
R771 1K
TR526 BC337
R721 1K
R772 1K
C593 22u 25V
R683 6K8
R686 270R
TR530 2N4125
TR538 2N4125
R716 6K8
R733 270R


12V
0V
PL511
TR528 BC337
D527 6V8
R680 470R
R681 1K
C544 10u 50V
R704 6K8
R706 12K
R710 5K6
C569 4n7
R718 100R
C565 4n7
C564 10u 50V
R717 470R
R724 4K7
R725 220R
C568 22u 25V
C559 100u 25V
R728 470R
R703 39R
TR534 2N4125
C562 10u 25V
R771 1K
TR526 BC337
R721 1K
R772 1K
C393 22u 25V
R705 270R
LK 528
PL520
C563 100u 25V
R708 1K
C566 100u 25V
R711 47R
R713 100R
R714 150R
R715 100R
C567 56p
R729 100R
R723 1K5
R712 82R
R722 470R
IC514 CA3046
C570 100n
LK 534
TR544 J112
PL516 BLUE PS2 INPUT
LK 530
R682 39R
E.ANALOG
MOL BLK
E4
E3
R580 1K
6V3
H SYNC.
V SYNC.
0V
12V
WIDTH
H.PHASE
V SHIFT
HEIGHT
PL513 (PIN 5)
PL510 (PIN9)
PL510 (PIN6)
R581 330R
PL517
PL504
R683 6K8
R684 12K
R767 5K6
C553 4n7
R690 100R
C551 4n7
C550 10u 50V
R693 470R
R695 4K7
R694 220R
C555 22u 25V
C558 100u 25V
TR530 2N4125
C547 10u 50V
PL521
C548 100u 25V
R770 47R
R686 270R
R685 1K
C552 100u 25V
R691 100R
R687 150R
R688 100R
C554 56p
R689 100R
R696 1K5
R692 82R
R697 470R
IC513 CA3046
C556 100n
LK 539
TR543 J112
R756 1M
PL515 GREEN PS2 INPUT
R731 39R
(A)
R716 6K8
R732 12K
R745 5K6
C579 4n7
R740 100R
C577 4n7
C575 10u 50V
R741 470R
R747 4K7
R766 220R
C580 22u 25V
C583 100u 25V
TR538 2N4125
C573 10u 50V
PL522
C574 100u 25V
R735 47R
R737 1K
C576 100u 25V
R736 100R
R743 150R
R744 100R
C578 56p
R738 100R
R746 1K5
R742 82R
R748 470R
IC515 CA3046
C581 100n
C591 100n

SERIES 7 MK2: INTERFACE PCB

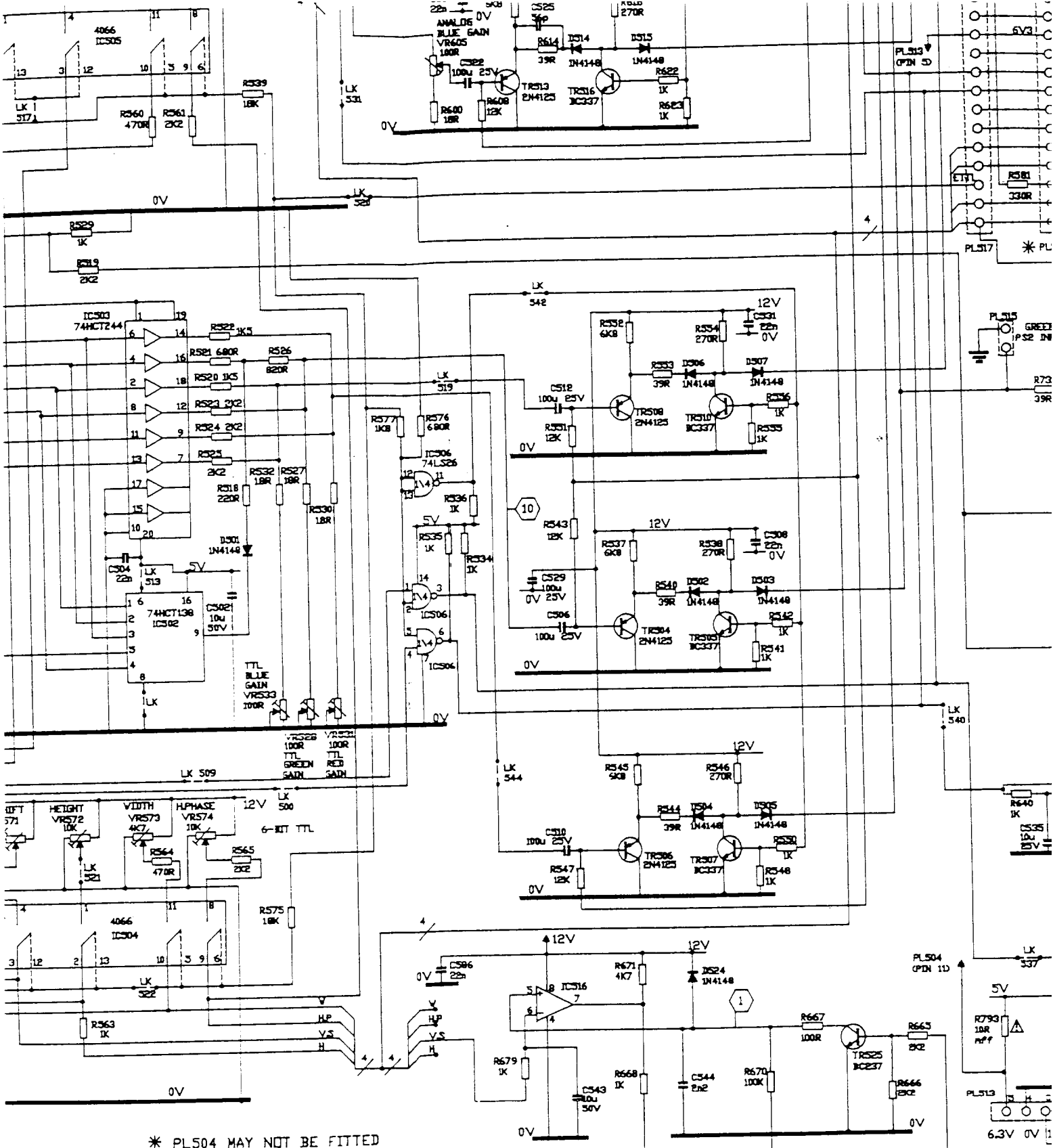




COMPONENTS MARKED ⚠ ARE SAFETY APPROVED COMPONENTS AND MUST ONLY BE REPLACED WITH COMPONENTS SUPPLIED OR APPROVED BY OUR SERVICE DEPARTMENT	
SYMBOL	DENOTES
LK	WIRE LINK
mff	METAL FILM FUSIBLE RESISTOR
⬡	WAVEFORM MEASUREMENT POINT
▭	VOLTAGE MEASUREMENT POINT

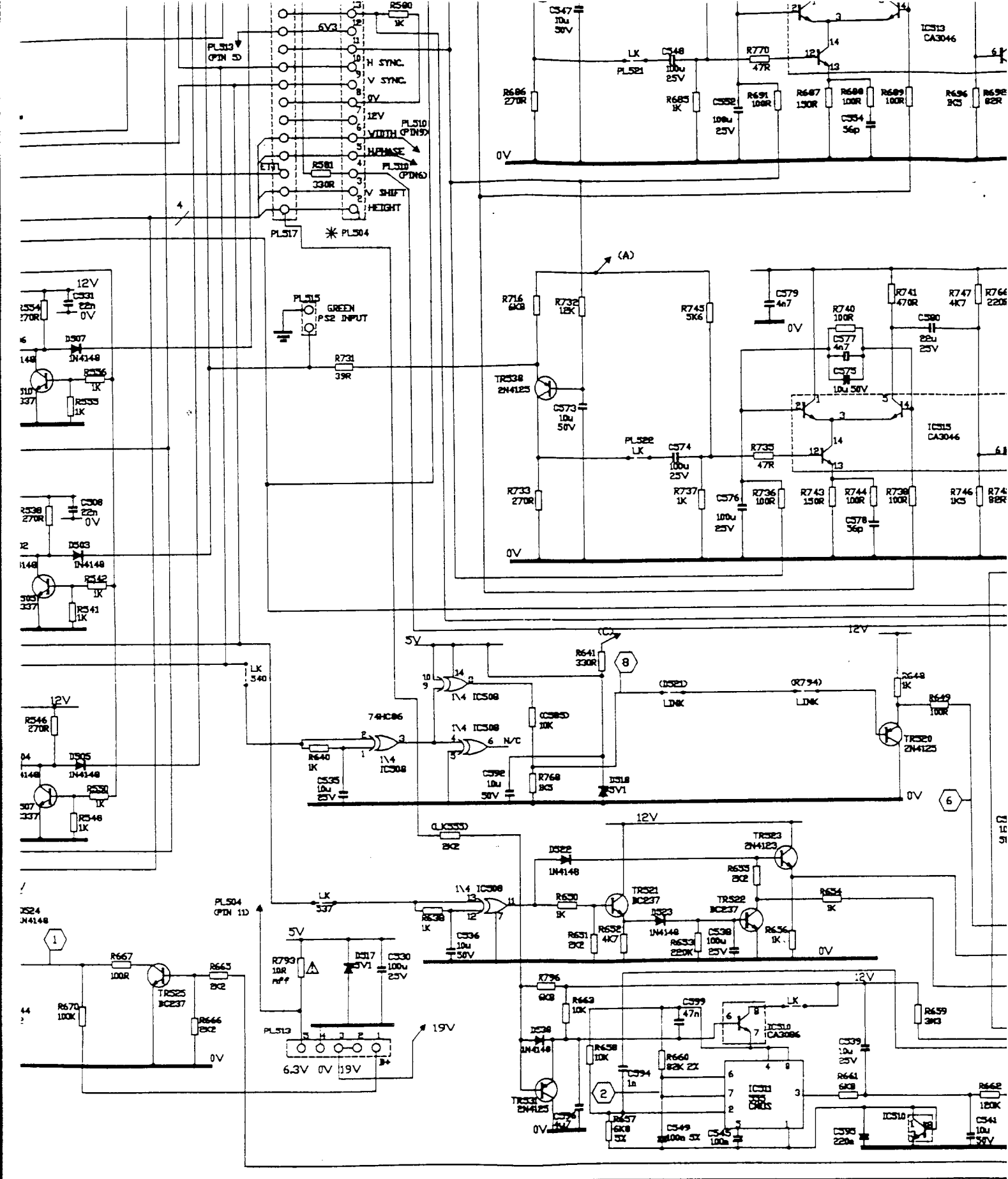
* PL504 MAY NOT BE FITTED

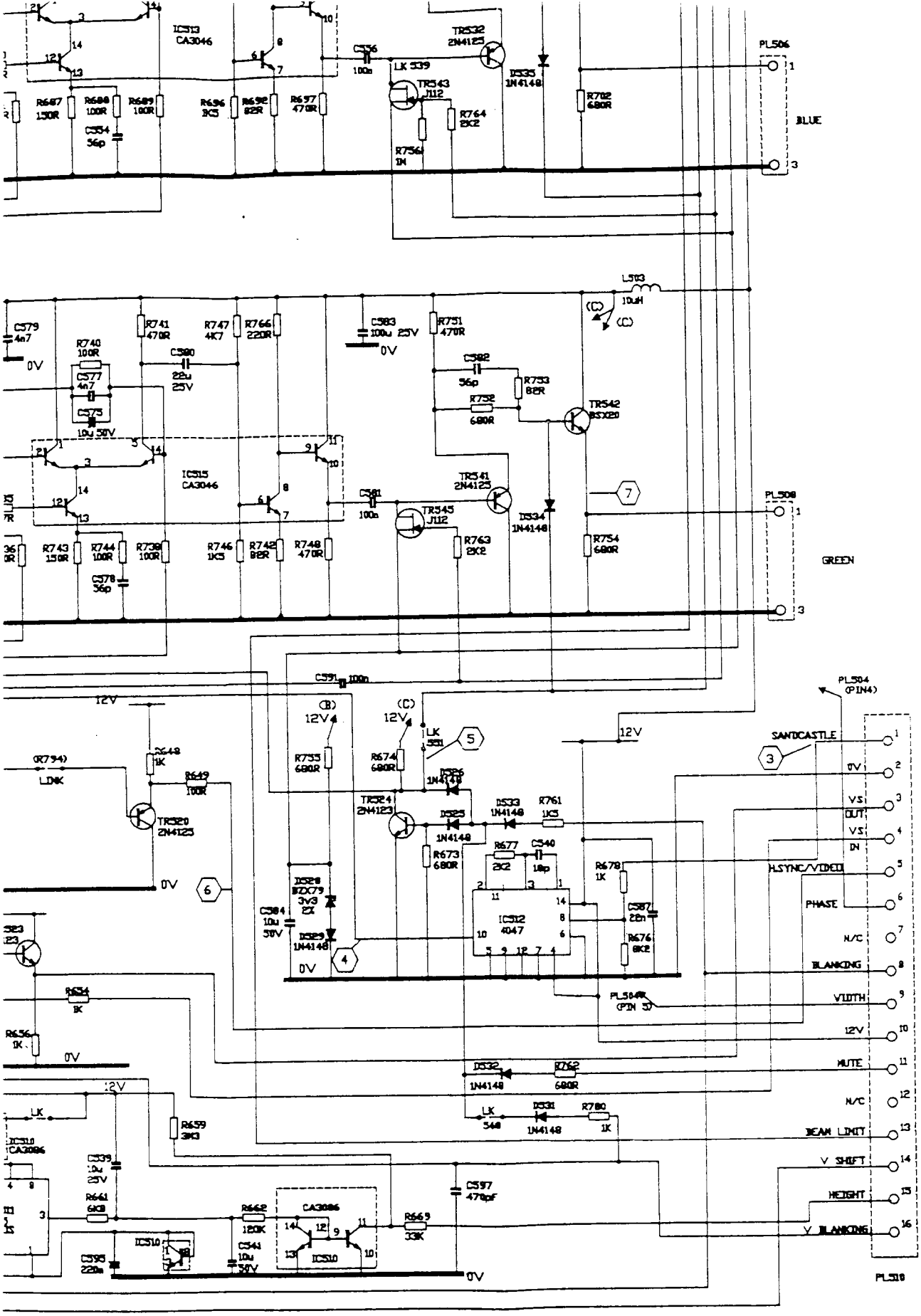
** PL512 CONNECTED TO +12V REGULATOR IC517



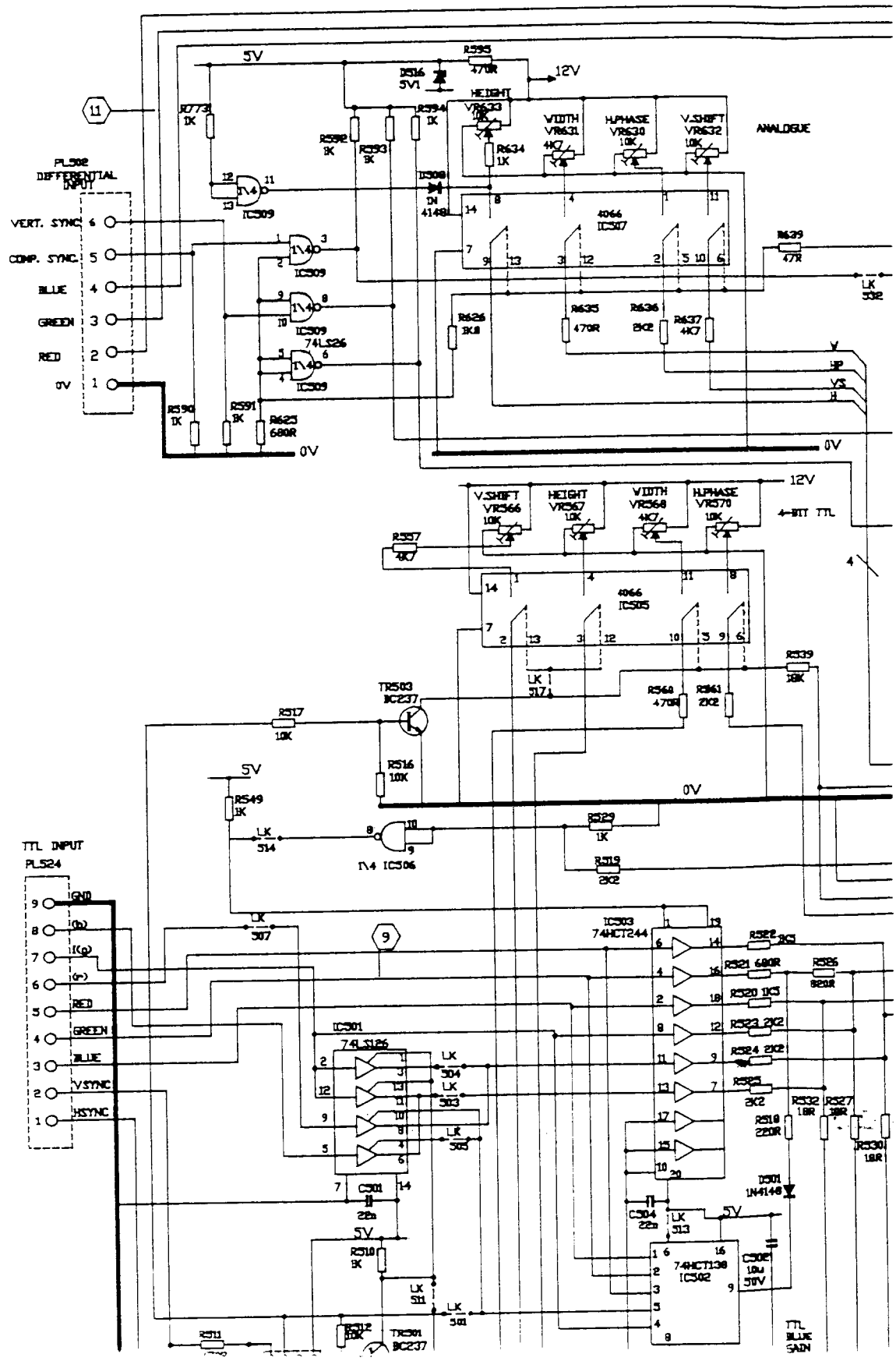
* PL504 MAY NOT BE FITTED

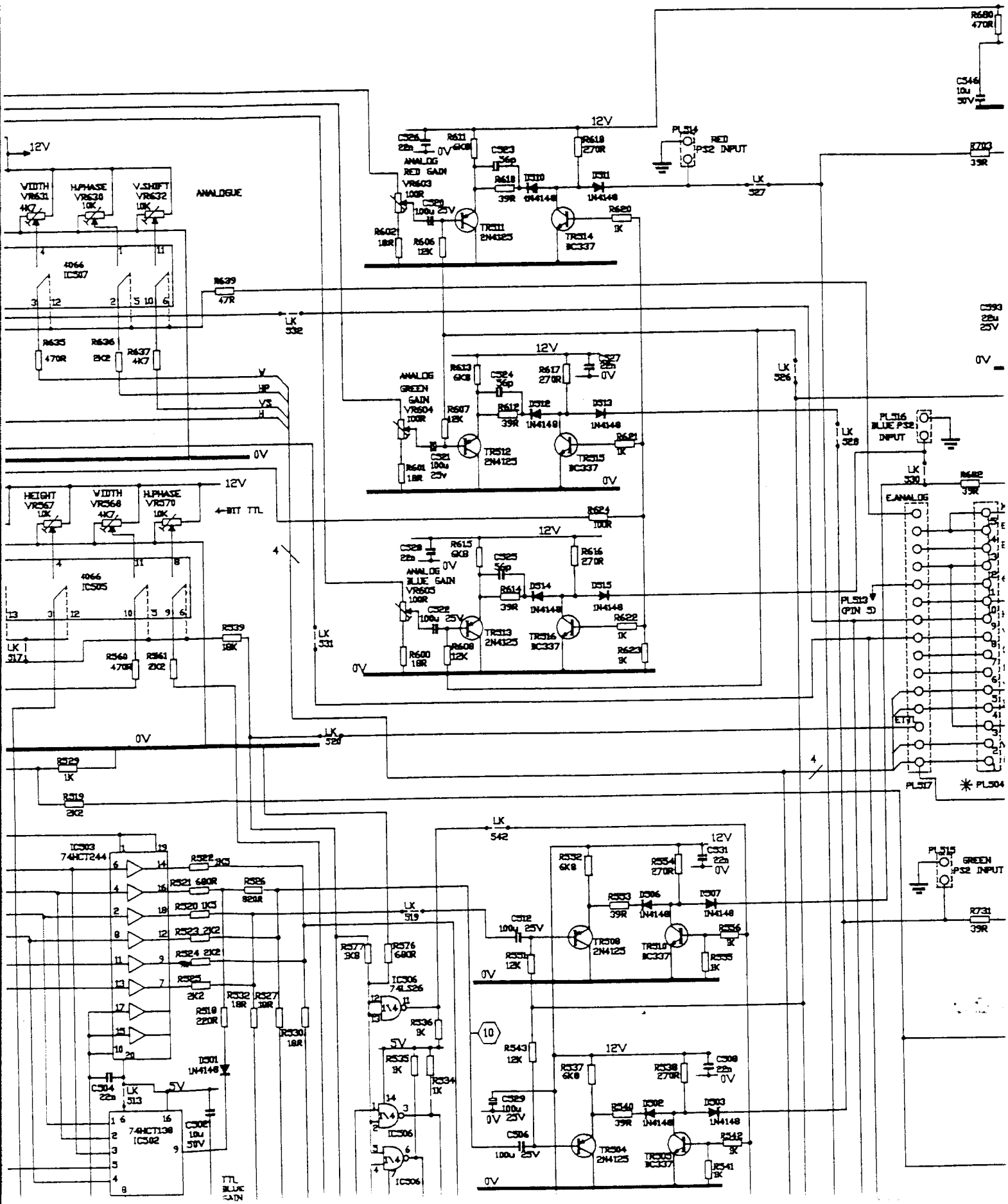
** PL512 CONNECTED TO +12V REGULATOR IC517

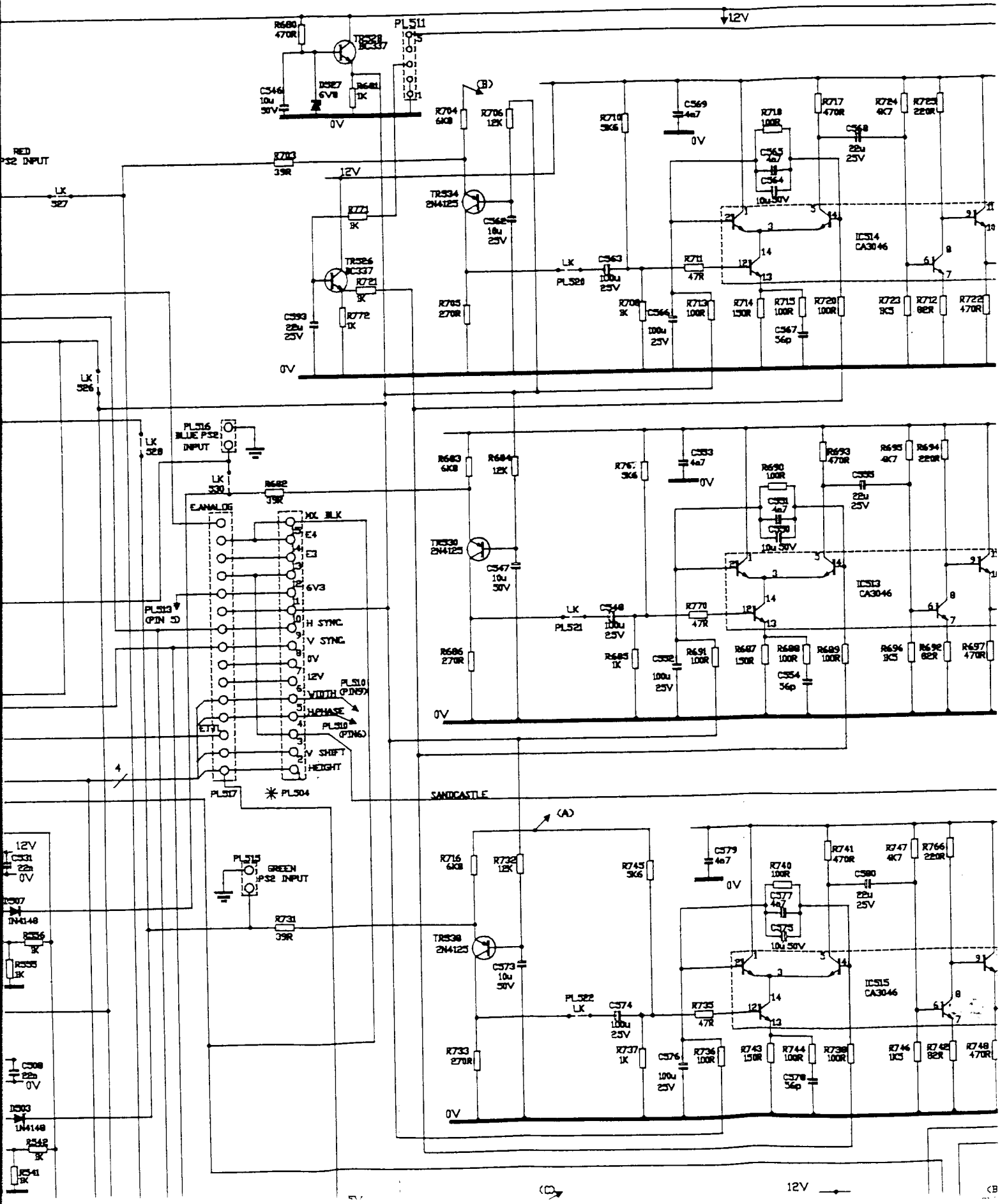

PL513 (PIN 5)
6V3
H SYNC.
V SYNC.
0V
12V
PL510 (PIN9)
WIDTH
H-PHASE
PL510 (PIN6)
V SHIFT
HEIGHT
R581 330R
PL517
PL504
PL515 GREEN PS2 INPUT
R731 39R
(A)
R716 6K8
R732 12K
R745 5K6
C579 4n7
R740 100R
R741 470R
R747 4K7
C580 22u 25V
C577 4n7
C575 10u 50V
TR538 2N4125
C573 10u 50V
IC313 CA3046
PL522 LK
C574 100u 25V
R735 47R
R733 270R
R737 1K
C576 100u 25V
R736 100R
R743 150R
R744 100R
R738 100R
C578 56p
R746 1K5
C547 10u 50V
LK PL521
C548 100u 25V
R770 47R
R686 270R
R685 1K
C552 100u 25V
R691 100R
R687 150R
R688 100R
R689 100R
C554 56p
R696 1K5
IC313 CA3046
C531 22n
D507 1N4148
R536 1K
R535 1K
C308 22n
D503 1N4148
R542 1K
R541 1K
LK 540
5V
R641 330R
(C)
8
IC4 IC508
74HC86
R640 1K
C535 10u 25V
C385D 10K
C592 10u 50V
R768 1K5
D518 5V1
(R521) LINK
(R794) LINK
R648 1K
R649 100R
TR520 2N4125
12V
R546 270R
D505 1N4148
R538 1K
R548 1K
6
CLK555D 2K2
D522 1N4148
TR523 2N4123
R633 2K2
R654 1K
TR521 BC237
R630 1K
TR522 BC237
R656 1K
R631 2K2
R652 4K7
D523 1N4148
R653 220K
C538 100u 25V
R638 1K
C536 10u 50V
PL504 (PIN 11)
LK 537
R667 100R
TR525 BC237
R663 2K2
R670 100K
R666 2K2
1
R793 10R
D517 5V1
C530 100u 25V
PL513
6.3V 0V 19V
19V
R796 6K8
R663 10K
C399 47n
IC310 CA3086
D538 1N4148
R658 10K
C394 1n
R660 82K 2%
TR537 2N4125
C528 4u7
R657 6K8 5%
C549 100n 5%
C545 100n
IC310
R659 3K3
C539 10u 25V
R641 6K8
R662 180K
C395 220n
C541 10u 50V
2



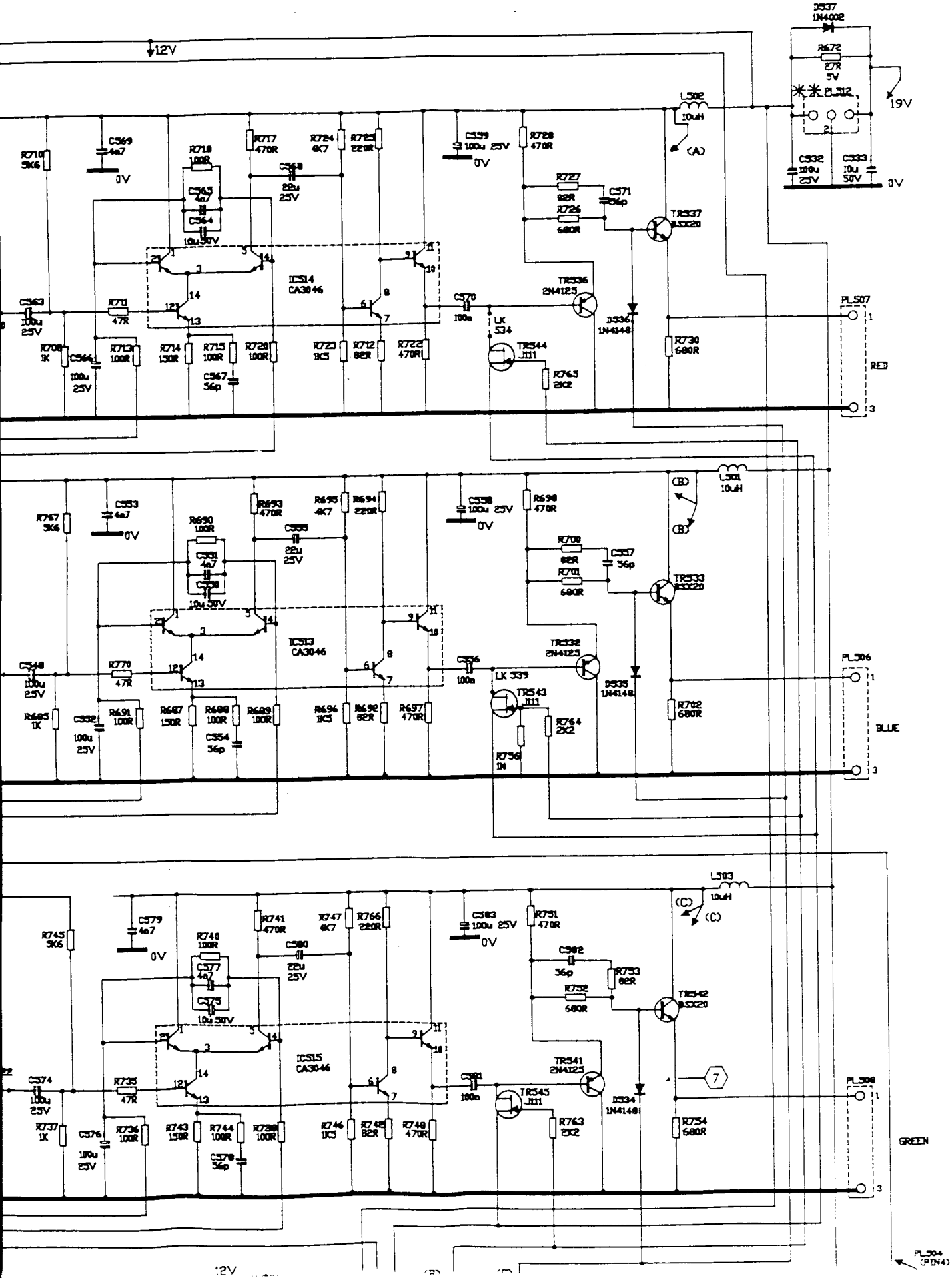
12L71DNS3 MODELS 12L71DNS3 MODELS

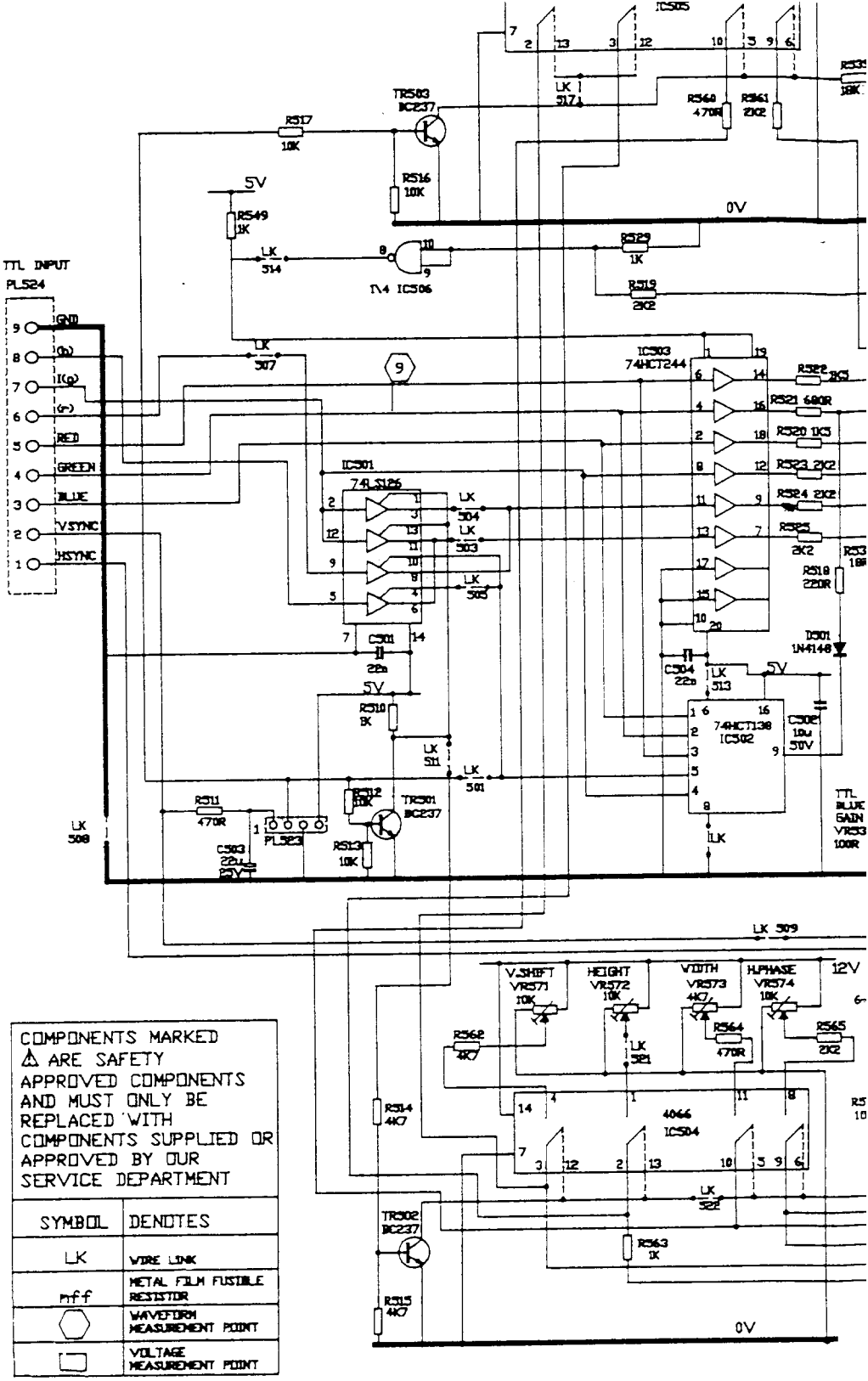

PL502
DIFFERENTIAL INPUT
VERT. SYNC
COMP. SYNC.
BLUE
GREEN
RED
0V
5V
12V
ANALOGUE
HEIGHT VR633
WIDTH VR631
H.PHASE VR630
V.SHIFT VR632
4066 IC507
IC509
74LS26
4-BIT TTL
V.SHIFT VR566
HEIGHT VR567
WIDTH VR568
H.PHASE VR570
4066 IC505
TR503 BC237
TTL INPUT
PL524
GND
B(b)
R(g)
G(y)
RED
GREEN
BLUE
VSYNC
HSYNC
IC503 74HCT244
IC501 74LS126
C501 22n
C504 22n
IC502 74HCT138
TR501 BC237
TTL BLUE GAIN


12V
VIDTH VR631 4K7
H.PHASE VR630 10K
V.SHIFT VR632 10K
ANALOGUE
4066 IC507
R639 47R
R635 470R
R636 2K2
R637 4K7
LK 532
V
HP
VS
H
0V
HEIGHT VR567 10K
VIDTH VR568 4K7
H.PHASE VR570 10K
4-BIT TTL
4066 IC505
R539 18K
R540 470R
R541 2K2
LK 517
LK 531
ANALOG RED GAIN VR603 100R
R611 6K8
C326 22n
C323 56p
R618 270R
R619 39R
D310 1N4148
D311 1N4148
C309 100u 25V
R620 1K
R602 18R
R606 12K
TR311 2N4125
TR314 BC337
PL514 RED PS2 INPUT
LK 527
R680 470R
C546 10u 35V
R703 39R
ANALOG GREEN GAIN VR604 100R
R613 6K8
C324 56p
R617 270R
C327 22n
R607 12K
R612 39R
D312 1N4148
D313 1N4148
C321 100u 25V
R621 1K
R601 18R
TR312 2N4125
TR315 BC337
LK 526
C393 22u 25V
PL516 BLUE PS2 INPUT
LK 528
R682 39R
E.ANALOG
ANALOG BLUE GAIN VR605 100R
R615 6K8
C325 56p
R616 270R
C328 22n
R614 39R
D314 1N4148
D315 1N4148
C322 100u 25V
R622 1K
R623 1K
R608 12K
R600 18R
TR313 2N4125
TR316 BC337
R624 100R
LK 531
PL513 GRN 5V
ETTL
PL517
PL504
LK 529
R529 1K
R519 2K2
IC303 74HCT244
R522 2K2
R521 680R
R526 820R
R520 1K5
R523 2K2
R524 2K2
R525 2K2
R532 18R
R527 39R
R518 220R
R530 18R
D301 1N4148
C304 22n
LK 513
5V
IC502 74HCT138
C302 10u 35V
TTL BLUE GAIN
R577 10K
R576 680R
IC306 74LS26
R536 1K
R535 1K
R534 1K
IC306
IC306
LK 519
LK 542
C312 100u 25V
R551 12K
R552 6K8
R554 270R
C331 22n
R553 39R
D306 1N4148
D307 1N4148
TR308 2N4125
TR310 BC337
R556 1K
R555 1K
0V
10
R543 12K
R537 6K8
R538 270R
C308 22n
C329 100u 25V
C306 100u 25V
R540 39R
D302 1N4148
D303 1N4148
TR304 2N4125
TR305 BC337
R542 1K
R541 1K
PL515 GREEN PS2 INPUT
R731 39R


12V
PL511
R680 470R
TR528 BC337
D527 6V8
R681 1K
C546 10u 50V
0V
(B)
R704 6K8
R706 12K
R710 5K6
C569 4n7
R718 100R
R717 470R
R724 4K7
R725 220R
C568 22u 25V
C565 4n7
C564 10u 50V
RED PS2 INPUT
LK 327
R703 39R
12V
TR534 2N4125
R771 1K
C562 10u 25V
IC514 CA3046
TR526 BC337
R721 1K
LK PL520
C563 100u 25V
R711 47R
C593 22u 25V
R772 1K
R705 270R
R708 1K
C566 100u 25V
R713 100R
R714 150R
R715 100R
R720 100R
C567 56p
R723 1K5
R712 82R
R722 470R
0V
LK 326
LK 328
PL516 BLUE PS2 INPUT
LK 330
R682 39R
E.ANALOG
XX BLK
E4
E3
6V3
H SYNC.
V SYNC.
0V
12V
H.PHASE
V SHIFT
HEIGHT
PL513 (PIN 5)
PL510 (PIN9)
PL510 (PIN6)
ET71
PL517
PL504
4
R683 6K8
R684 12K
R707 5K6
C553 4n7
R690 100R
R693 470R
R695 4K7
R694 220R
C555 22u 25V
C551 4n7
C550 10u 50V
TR530 2N4125
C547 10u 50V
IC513 CA3046
LK PL521
C548 100u 25V
R770 47R
R686 270R
R685 1K
C552 100u 25V
R691 100R
R687 150R
R688 100R
R689 100R
C554 56p
R696 1K5
R692 82R
R697 470R
0V
SANDCASTLE
(A)
R716 6K8
R732 12K
R745 5K6
C579 4n7
R740 100R
R741 470R
R747 4K7
R766 220R
C580 22u 25V
C577 4n7
C575 10u 50V
TR538 2N4125
C573 10u 50V
IC515 CA3046
PL522 LK
C574 100u 25V
R735 47R
R733 270R
R737 1K
C576 100u 25V
R736 100R
R743 150R
R744 100R
R738 100R
C578 56p
R746 1K5
R742 82R
R748 470R
0V
12V
C531 22u
0V
D507 1N4148
R556 1K
R555 1K
C508 22u
0V
D503 1N4148
R542 1K
R541 1K
PL515 GREEN PS2 INPUT
R731 39R
12V
(C)
(B)

SERIES 7 MK2: INTERFACE PCB

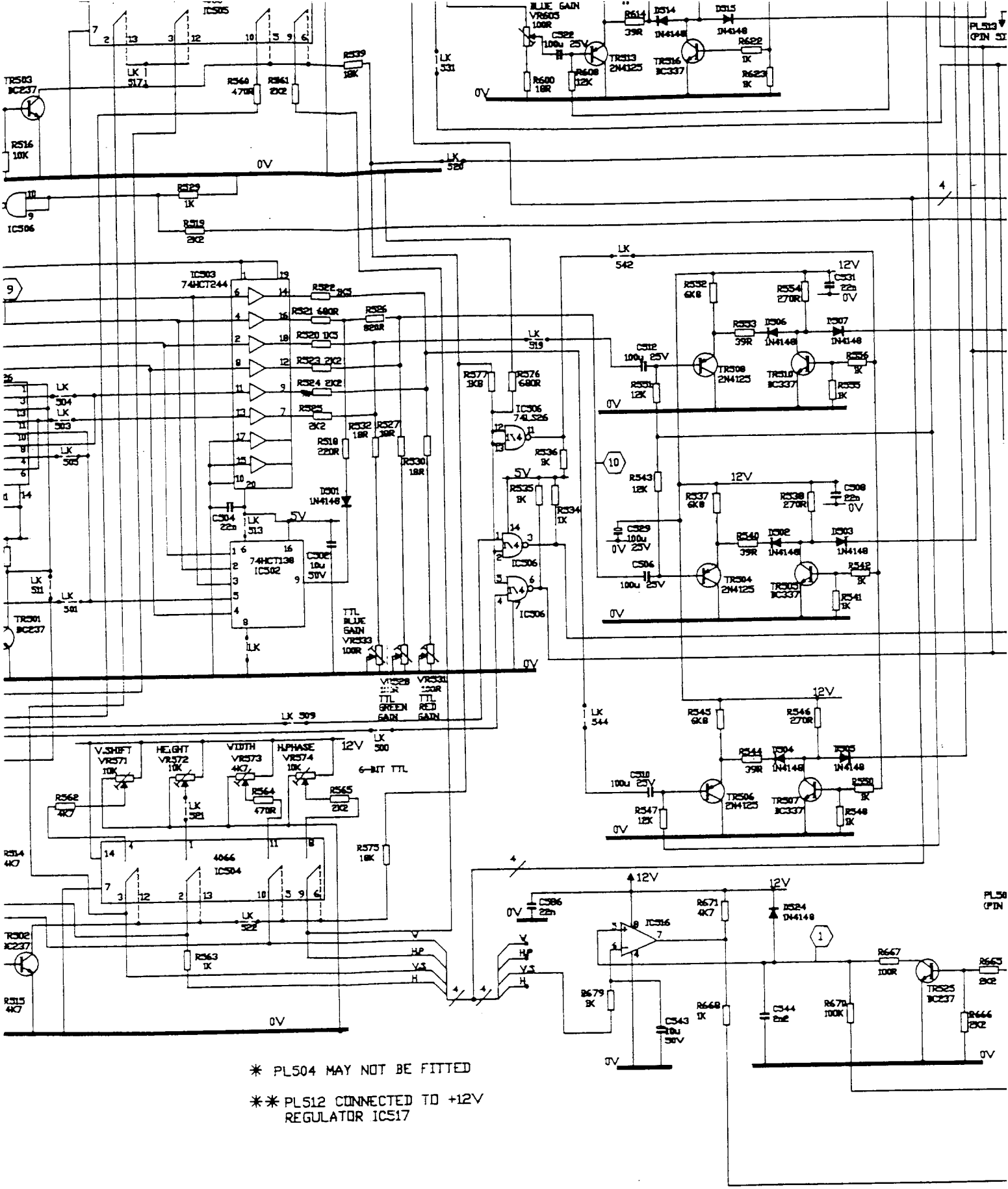




COMPONENTS MARKED ⚠ ARE SAFETY APPROVED COMPONENTS AND MUST ONLY BE REPLACED WITH COMPONENTS SUPPLIED OR APPROVED BY OUR SERVICE DEPARTMENT	
SYMBOL	DENOTES
LK	WIRE LINK
mfr	METAL FILM FUSIBLE RESISTOR
⬡	WAVEFORM MEASUREMENT POINT
▭	VOLTAGE MEASUREMENT POINT

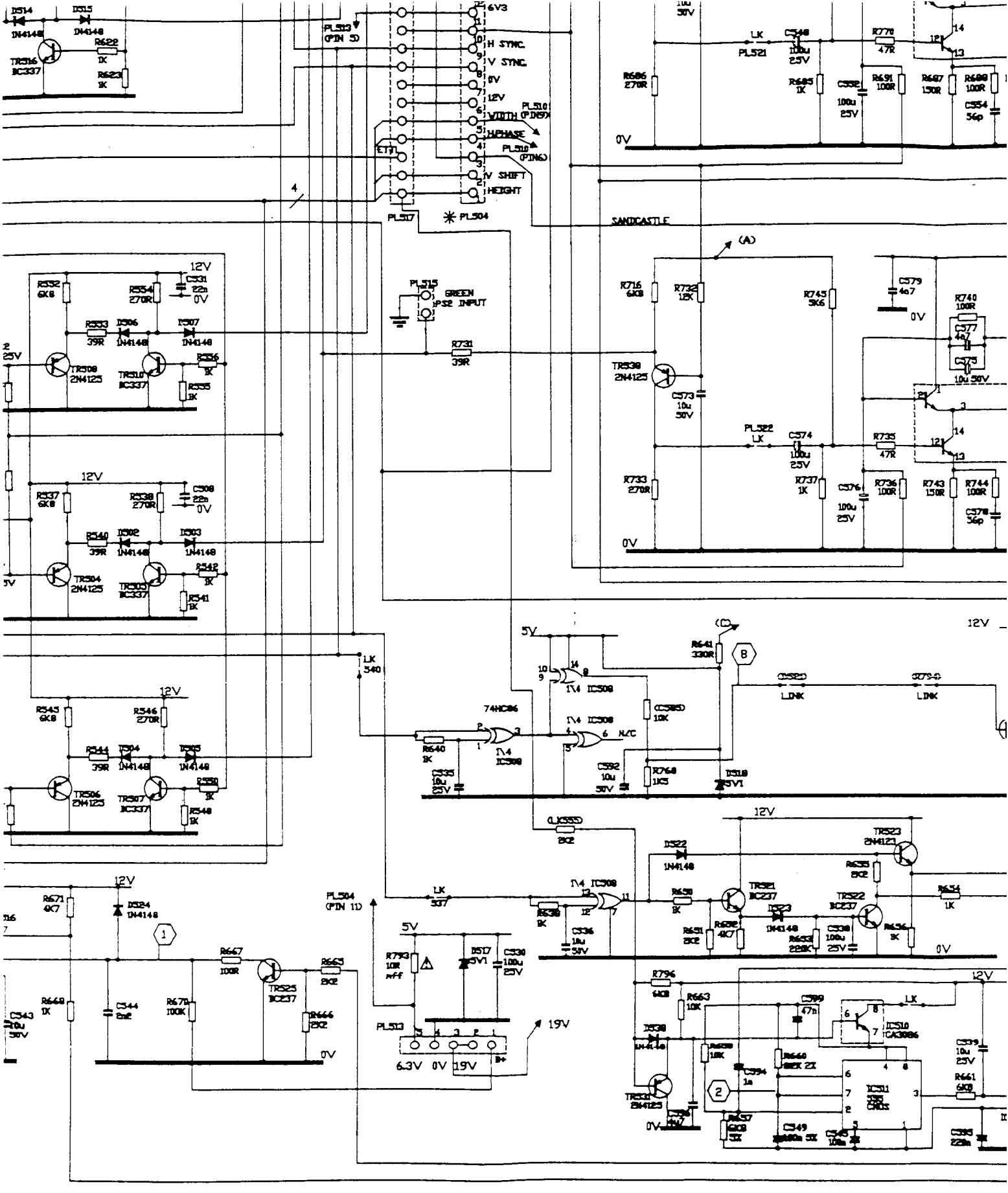
* PL504 MAY N

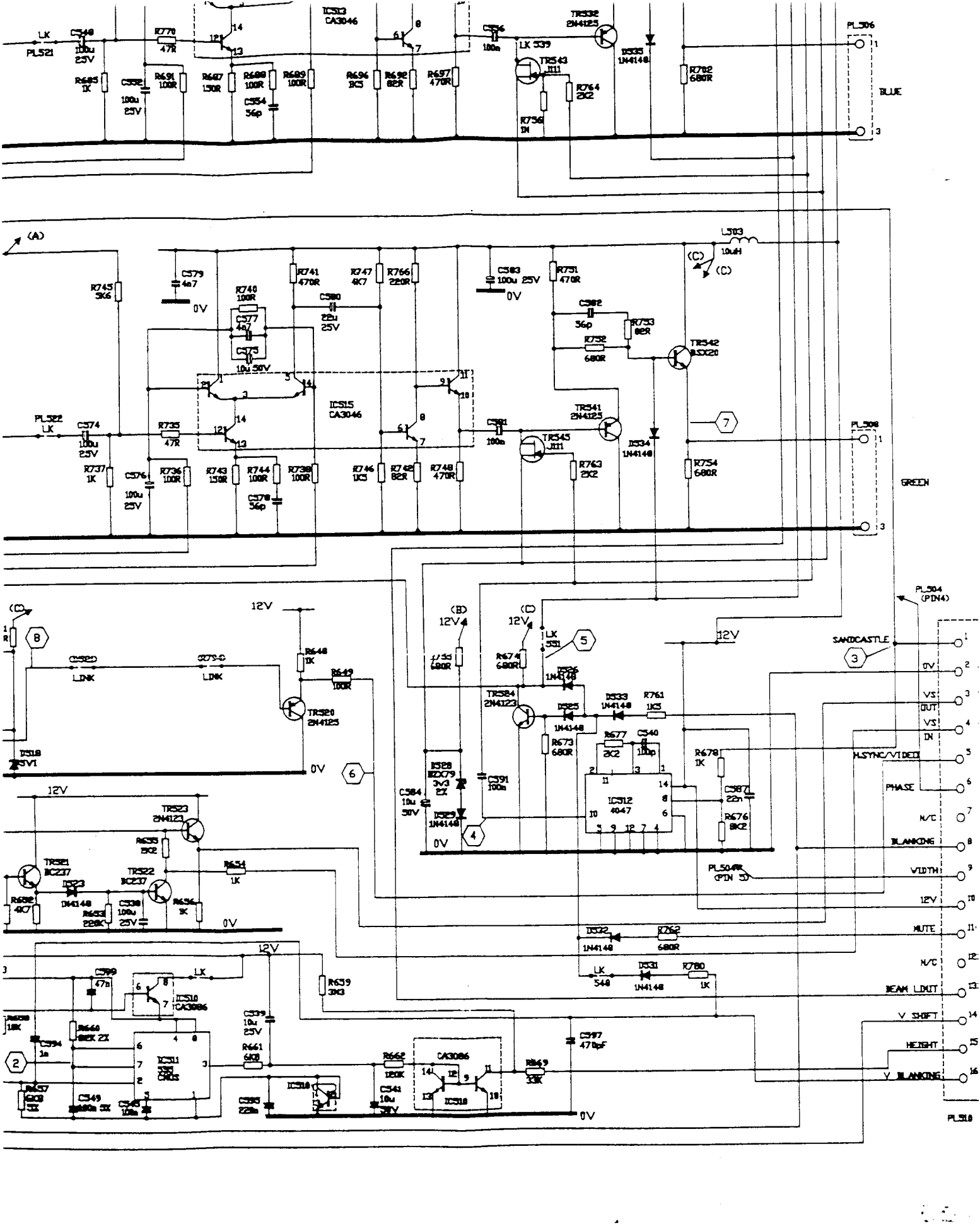
** PL512 CONN
REGULATOR



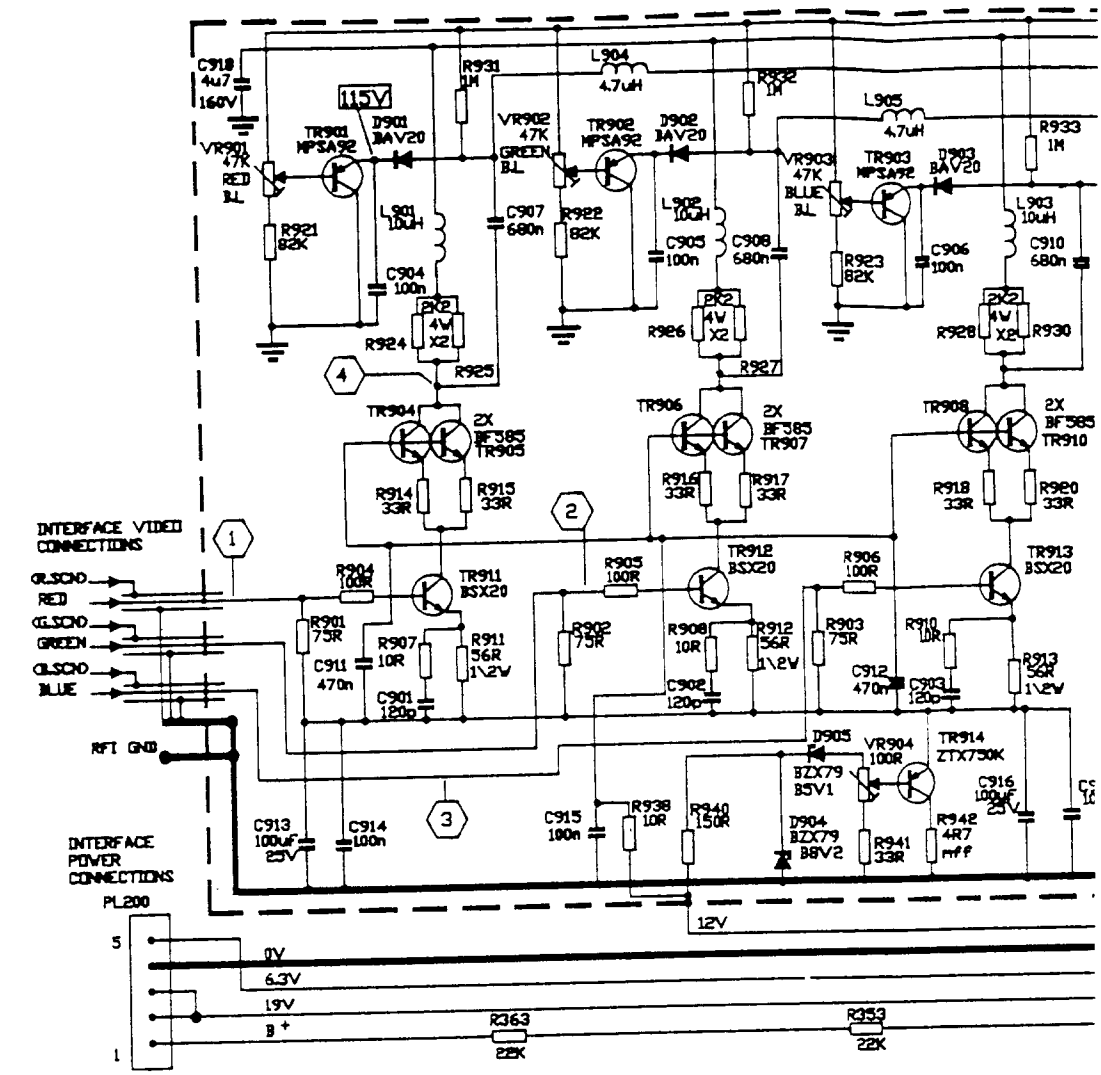
* PL504 MAY NOT BE FITTED

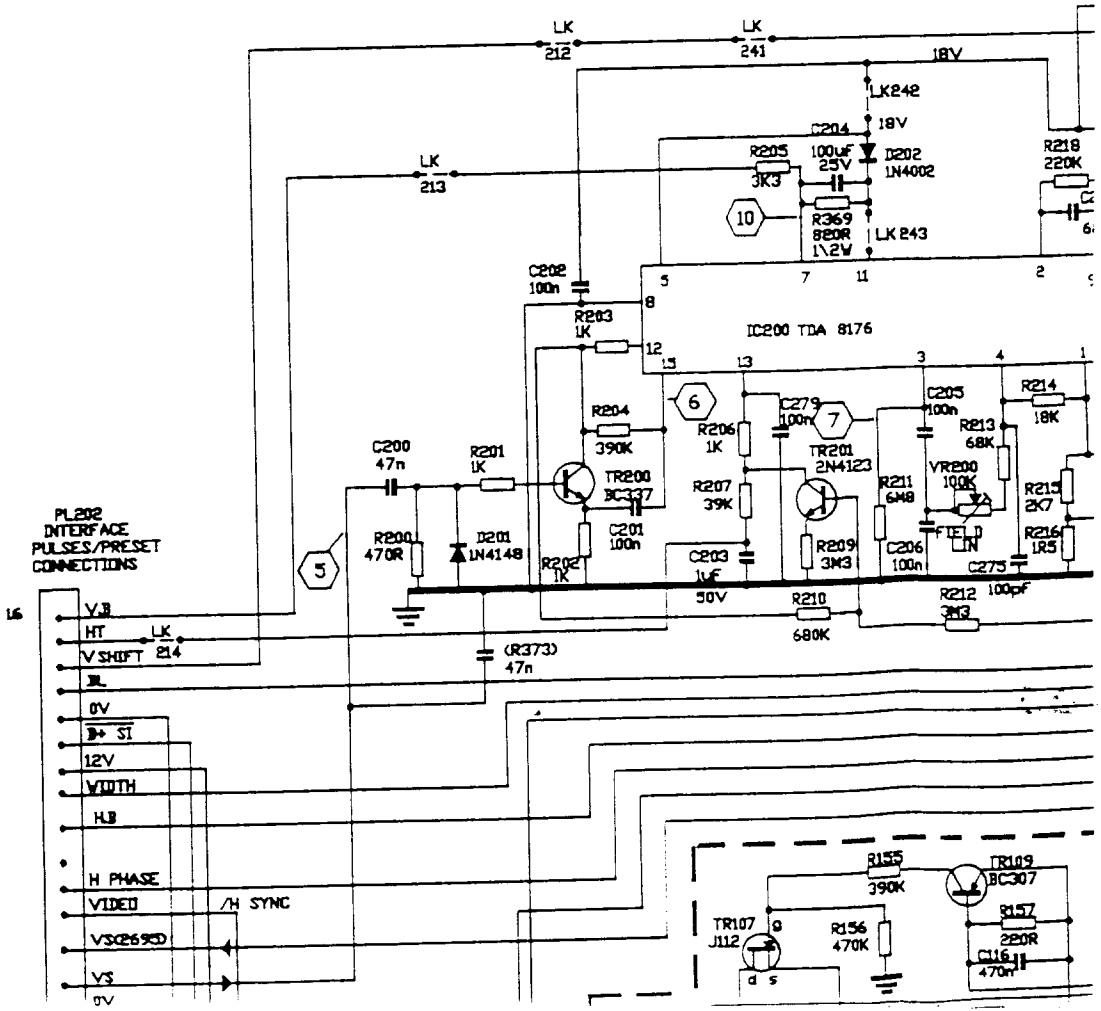
** PL512 CONNECTED TO +12V REGULATOR IC517

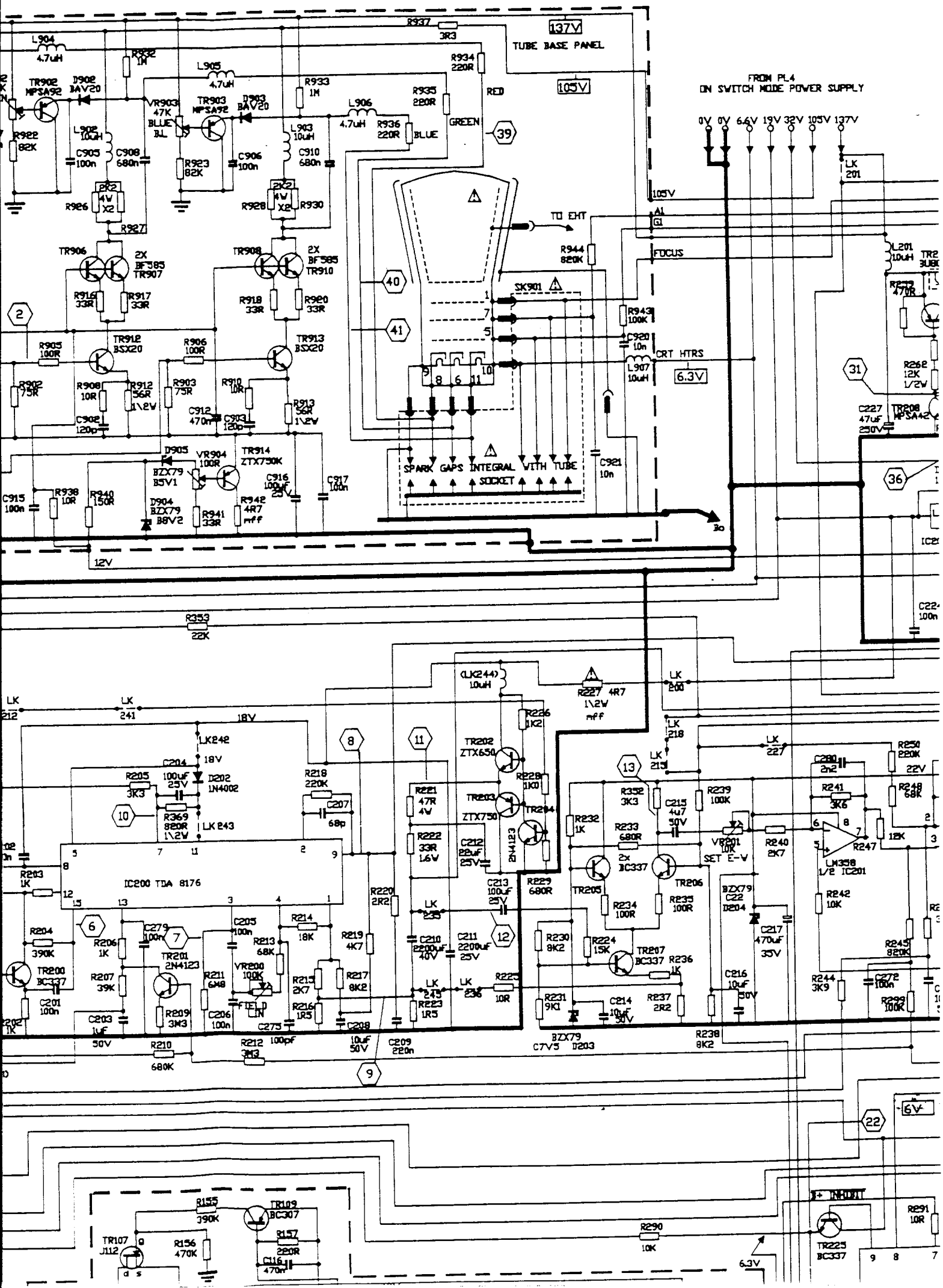

6V3
H SYNC.
V SYNC.
0V
12V
V SHIFT
HEIGHT
PL513 (PIN 5)
PL510 (PIN9)
PL510 (PIN6)
PL517
PL504
SANDCASTLE
PL515
GREEN
PS2 INPUT
PL521
PL522
LK
5V
12V
0V
19V
6.3V 0V 19V
74HC86
PL504 (PIN 11)
LINK
TR538 2N4125
TR539 2N4125
TR504 2N4125
TR506 2N4125
TR508 2N4125
TR509 2N4125
TR523 2N4123
TR525 BC237
TR521 BC237
TR522 BC237
TR510 BC337
TR505 BC337
TR507 BC337
IC510 CA3086
IC511 555 CMOS
IC508
IC509
IC512
IC513
1N4148
1N4148
1N4148

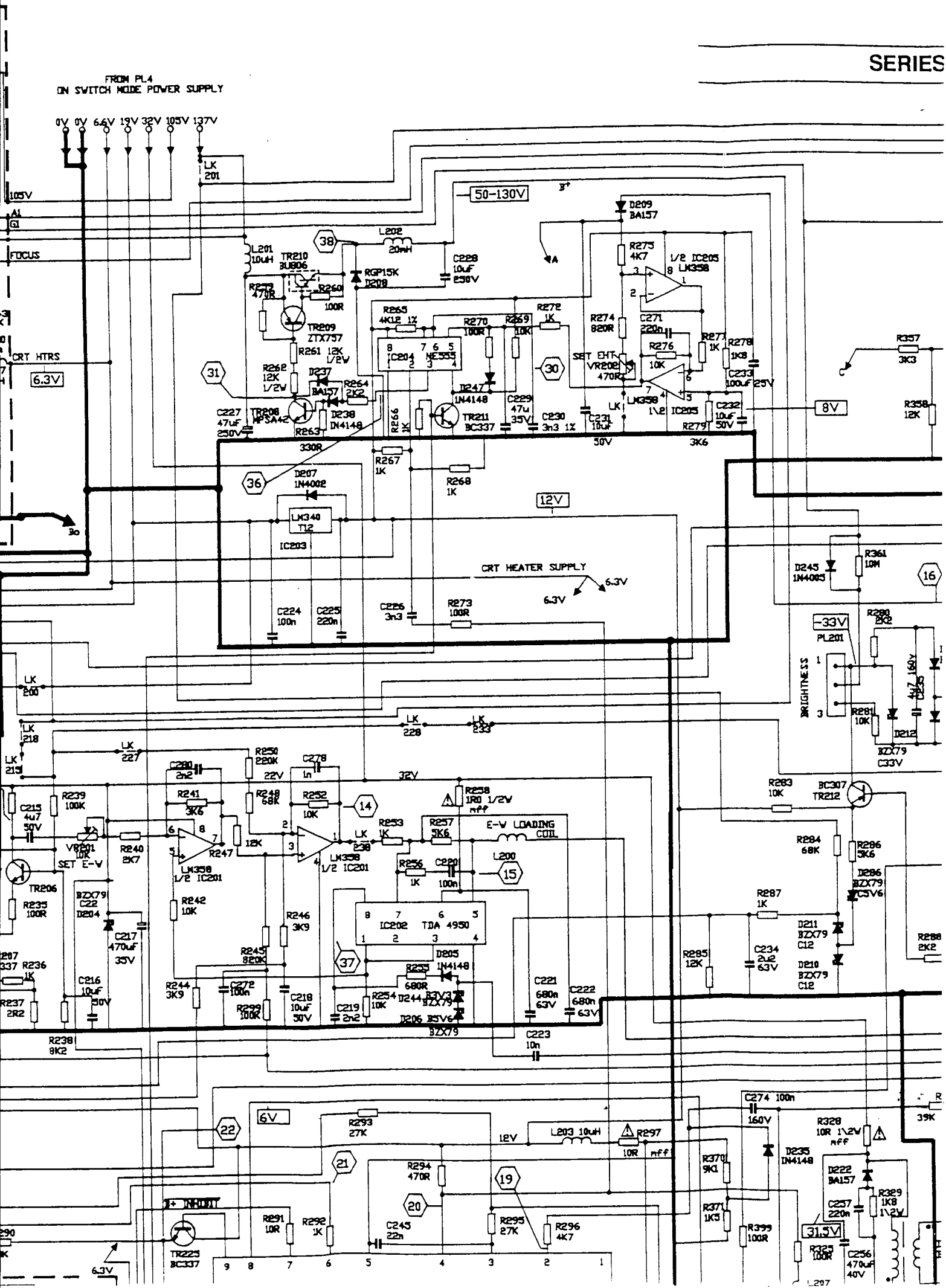


12" MODELS EXCEPT 12L71DNS3 12" MODELS EXCEPT 12L71DNS3

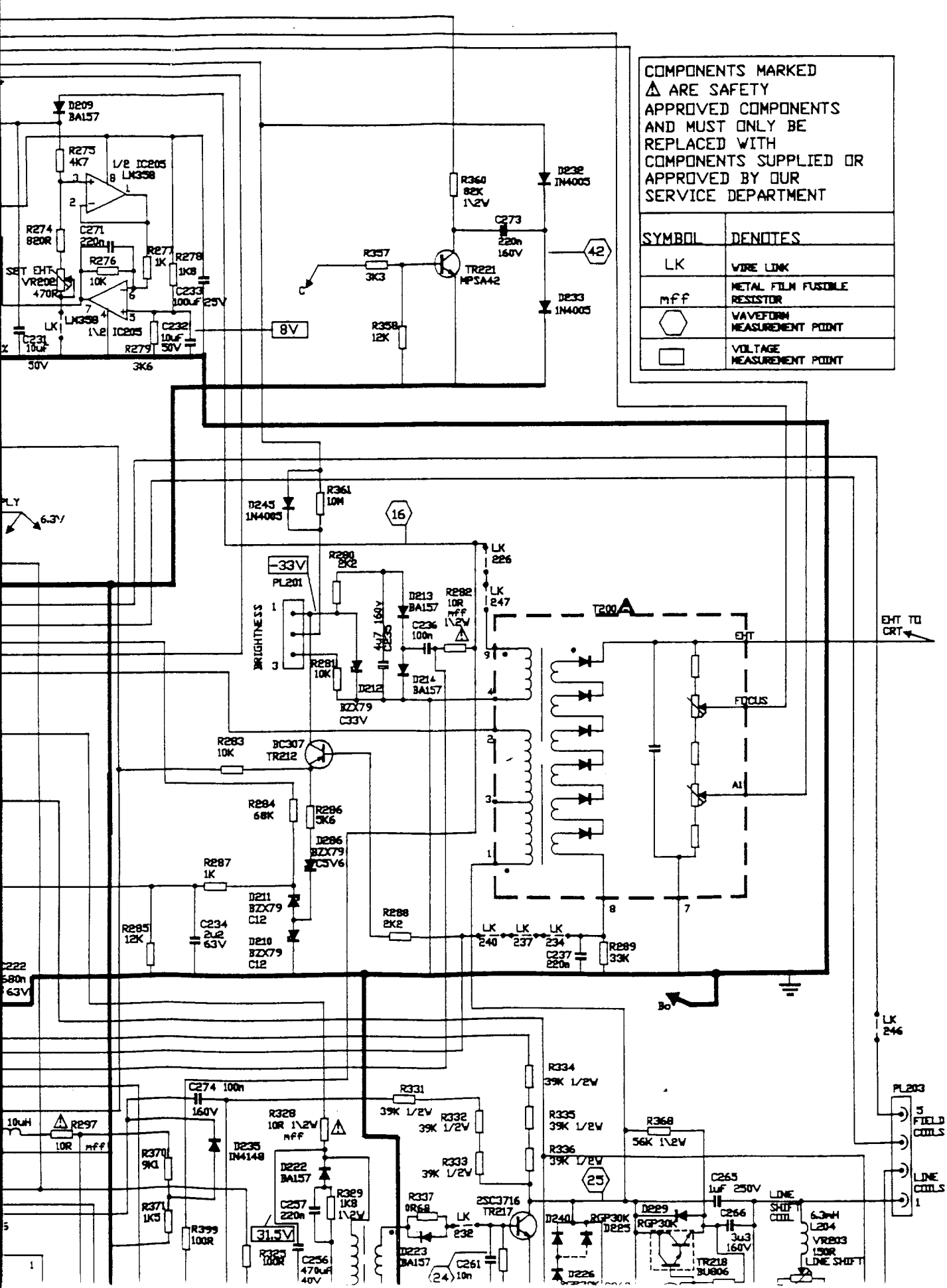

INTERFACE VIDEO CONNECTIONS
R.SCND
RED
G.SCND
GREEN
B.SCND
BLUE
RFT GND
INTERFACE POWER CONNECTIONS
PL200
0V
6.3V
19V
B+
12V
115V
TR901 MPSA92
TR902 MPSA92
TR903 MPSA92
TR904 2X BF585 TR905
TR906 2X BF585 TR907
TR908 2X BF585 TR910
TR911 BSX20
TR912 BSX20
TR913 BSX20
TR914 ZTX750K
D901 BAV20
D902 BAV20
D903 BAV20
D904 BZX79 B8V2
D905 BZX79 B5V1
VR901 47K RED BL
VR902 47K GREEN BL
VR903 47K BLUE BL
L901 10uH
L902 10uH
L903 10uH
L904 4.7uH
L905 4.7uH
C901 120p
C902 120p
C903 120p
C904 100n
C905 100n
C906 100n
C907 680n
C908 680n
C910 680n
C911 470n
C912 470n
C913 100uF 25V
C914 100n
C915 100n
C916 100uF 25V
R901 75R
R902 75R
R903 75R
R904 100R
R905 100R
R906 100R
R907 10R
R908 10R
R910 10R
R911 56R 1\2W
R912 56R 1\2W
R913 56R 1\2W
R914 33R
R915 33R
R916 33R
R917 33R
R918 33R
R920 33R
R921 82K
R922 82K
R923 82K
R924
R925
R926
R927
R928
R930
R931 1M
R932 1M
R933 1M
R938 10R
R939 150R
R941 33R
R942 4R7 mff
R363 22K
R353 22K
PR2 4W X2

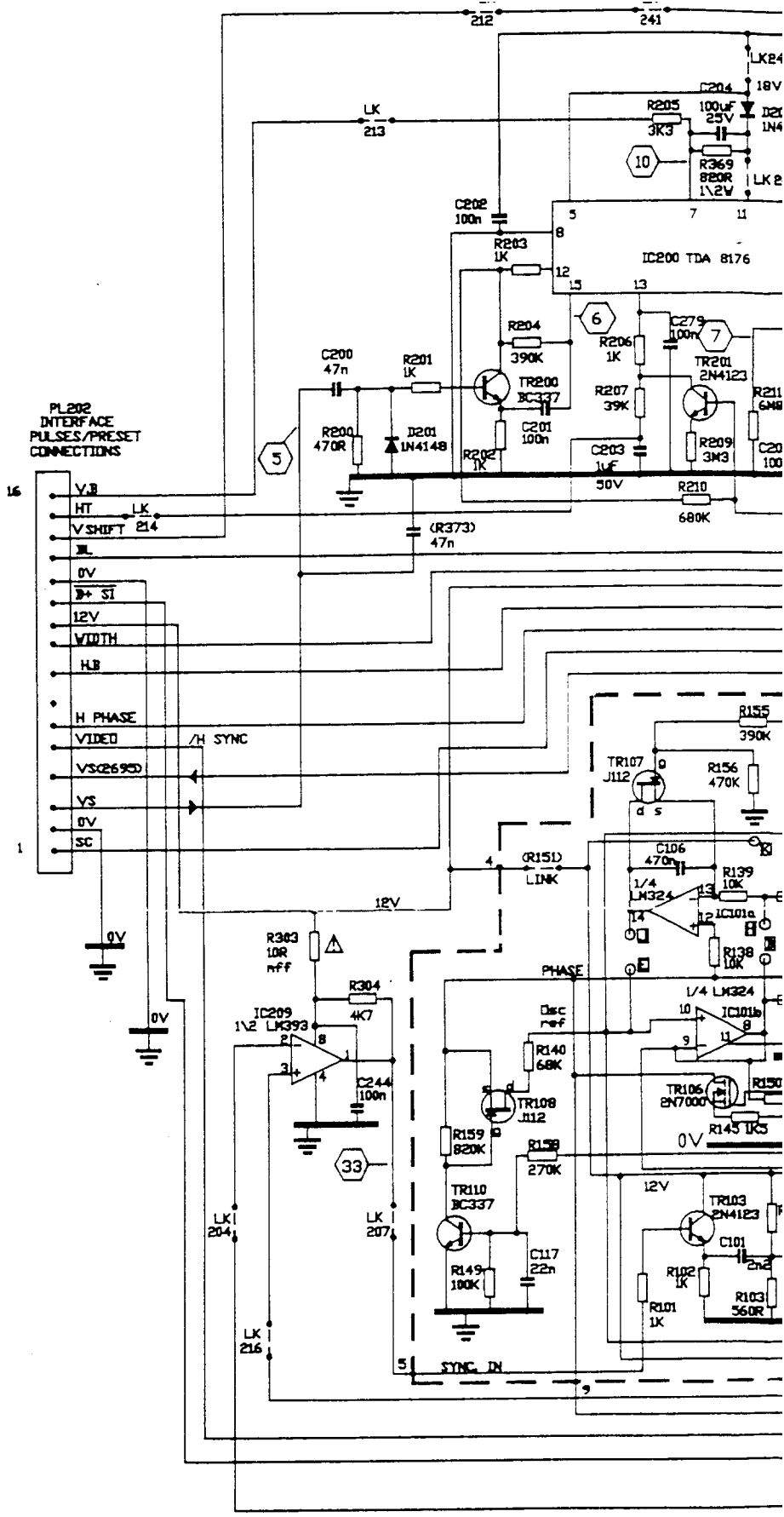

PL202 INTERFACE PULSES/PRESET CONNECTIONS
VJB
HT
LK 214
V SHIFT
JBL
0V
B+ SI
12V
WIDTH
HJB
H PHASE
VIDEO
/H SYNC
VS(26950)
VS
0V
LK 212
LK 241
LK 213
18V
LK242
LK243
C204 100uF 25V
D202 1N4002
R205 3K3
R369 820R 1\2W
R218 220K
C202 100n
R203 1K
IC200 TDA 8176
R204 390K
R206 1K
C279 100n
C205 100n
R214 18K
R213 68K
R207 39K
TR201 2N4123
R211 6M8
VR200 100K
R215 2K7
R216 1R5
C206 100n
C275
C200 47n
R201 1K
TR200 BC337
C201 100n
R200 470R
D201 1N4148
R202 1K
C203 1uF 50V
R209 3M3
R210 680K
R212 3M3
100pF
(R373) 47n
R155 390K
TR109 BC307
R157 220R
TR107 J112
R156 470K
C116 470n

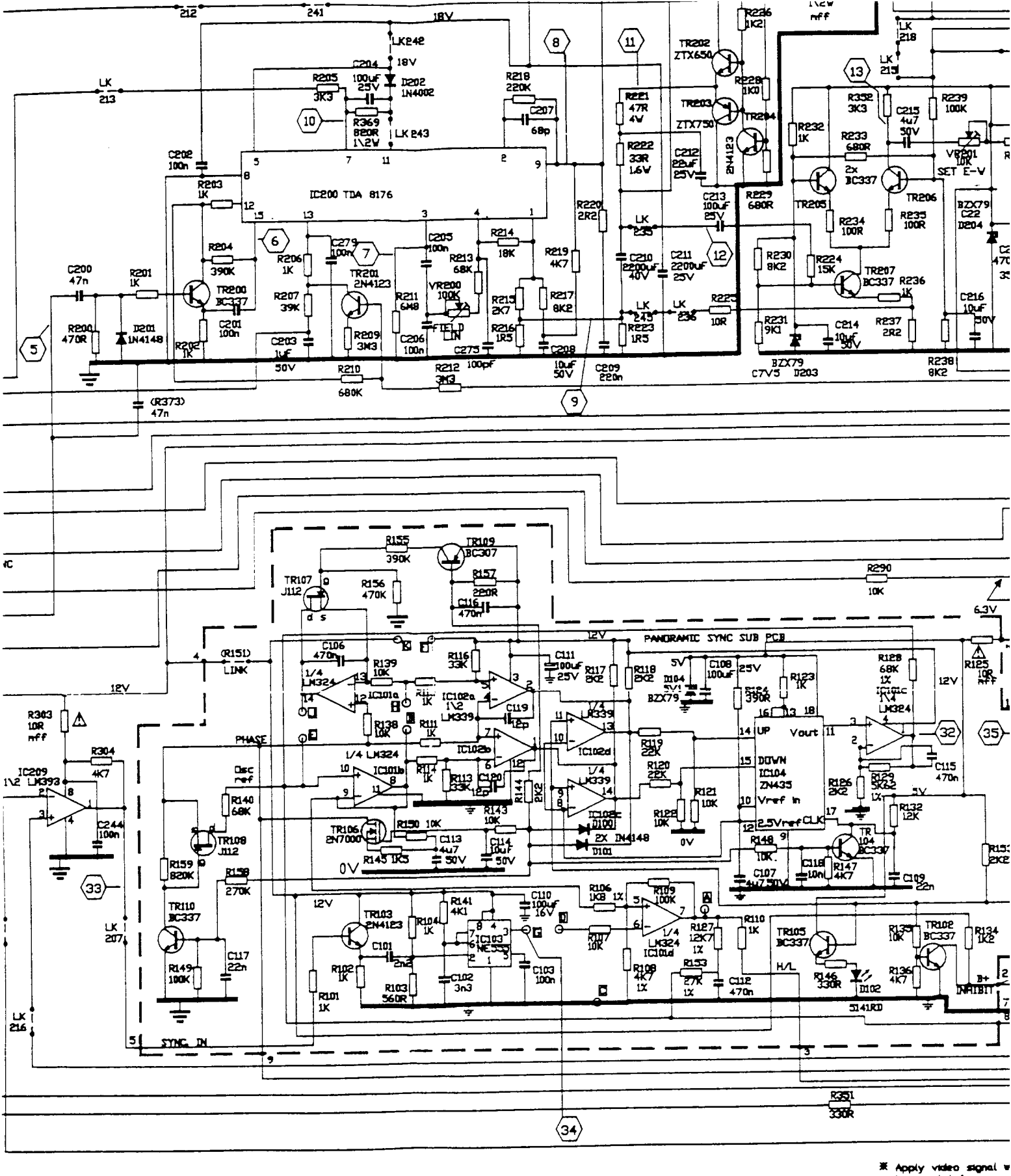

137V
TUBE BASE PANEL
105V
FROM PL4
ON SWITCH MODE POWER SUPPLY
0V 0V 6.6V 19V 32V 105V 137V
TO EHT
FOCUS
CRT HTRS
6.3V
SPARK GAPS INTEGRAL WITH TUBE SOCKET
SK901
12V
18V
IC200 TDA 8176
LM358 1/2 IC201
SET E-V
6V
TR109 BC307
TR107 J112
TR225 BC337


FROM PL4
ON SWITCH MODE POWER SUPPLY
0V 0V 6.6V 19V 32V 105V 137V
LK 201
105V
A1
G1
FOCUS
CRT HTRS
6.3V
50-130V
B+
D209 BA157
L202 20mH
38
L201 10uH
TR210 BU806
RGP15K D208
C228 10uF 250V
R273 4K7
1/2 IC205 LM358
R260 100R
R265 4K12 1%
R270 100R
R269 10K
R272 1K
R274 820R
C271 220n
R276 10K
R277 1K
R278 1K8
C233 100uF 25V
R357 3K3
TR209 ZTX757
R261 12K 1/2W
IC204 NE555
SET EHT VR202 470R
LM358 1\2 IC205
C232 10uF 50V
8V
R358 12K
31
30
R262 12K 1/2W
D237 BA157
R264 2K2
D247 1N4148
C229 47u 35V
C230 3n3 1%
C231 10uF 50V
R279 3K6
C227 47uF 250V
TR208 MPSA42
D238 IN4148
R263 330R
R266 1K
TR211 BC337
R267 1K
R268 1K
36
D207 1N4002
12V
LM340 T12
IC203
CRT HEATER SUPPLY
6.3V
6.3V
C224 100n
C225 220n
C226 3n3
R273 100R
D245 1N4005
R361 10M
16
-33V
PL201
R280 2K2
BRIGHTNESS
R281 10K
D212 BZX79 C33V
LK 200
LK 218
LK 213
LK 227
LK 228
LK 229
C280 2n2
R250 220K
22V
C278 1n
32V
R283 10K
BC307 TR212
R239 100K
R241 3K6
R248 68K
R252 10K
14
R258 1R0 1/2W mff
C215 4u7 50V
VR201 10K SET E-V
R240 2K7
LM358 1/2 IC201
R247 12K
R253 1K
R257 5K6
E-V LOADING COIL
R284 68K
R286 5K6
TR206
R235 100R
R256 1K
C220 100n
L200
15
R287 1K
D286 BZX79 C5V6
BZX79 C22 D204
R242 10K
IC202 TDA 4950
R246 3K9
D211 BZX79 C12
D210 BZX79 C12
R288 2K2
C217 470uF 35V
R245 820K
37
D205 IN4148
R285 12K
C234 2u2 63V
R255 680R
R244 3K9
C272 100n
C218 10uF 50V
R254 10K
D244 BZV3 BZX79
D206 BZV6 BZX79
C219 2n2
C221 680n 63V
C222 680n 63V
C223 10n
R238 9K2
C274 100n 160V
R328 10R 1\2W mff
39K
22
6V
R293 27K
12V
L203 10uH
R297 10R mff
D235 IN4148
R370 9K1
D222 BA157
21
R294 470R
19
20
R329 1K8 1\2W
R371 1K5
C257 220n
R399 100R
31.5V
R295 27K
R296 4K7
C245 22n
R291 10R
R292 1K
TR225 BC337
C256 470uF 40V
6.3V
9 8 7 6 5 4 3 2 1

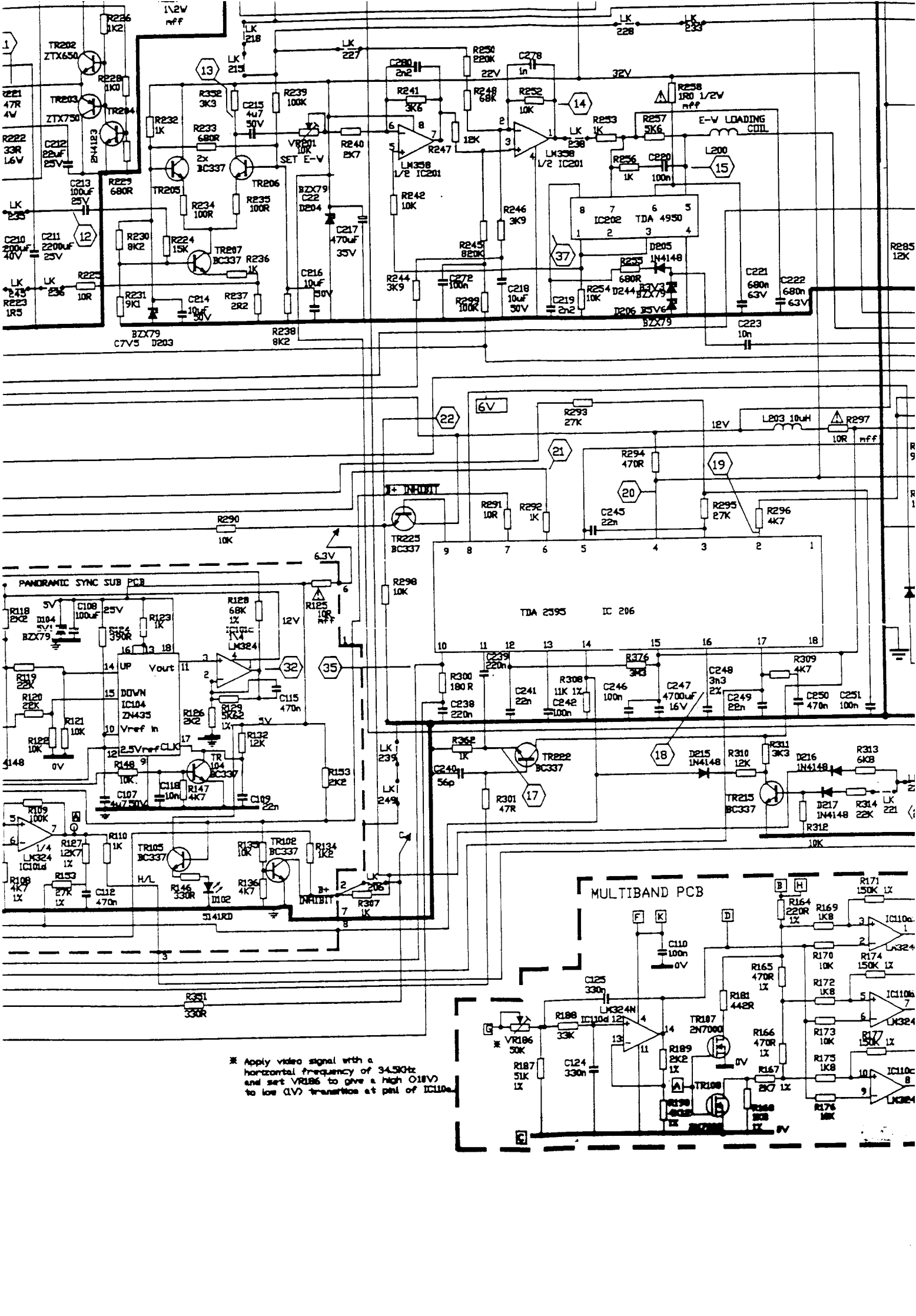
SERIES 7 MK2: DRIVE/DEFLECTION PCB

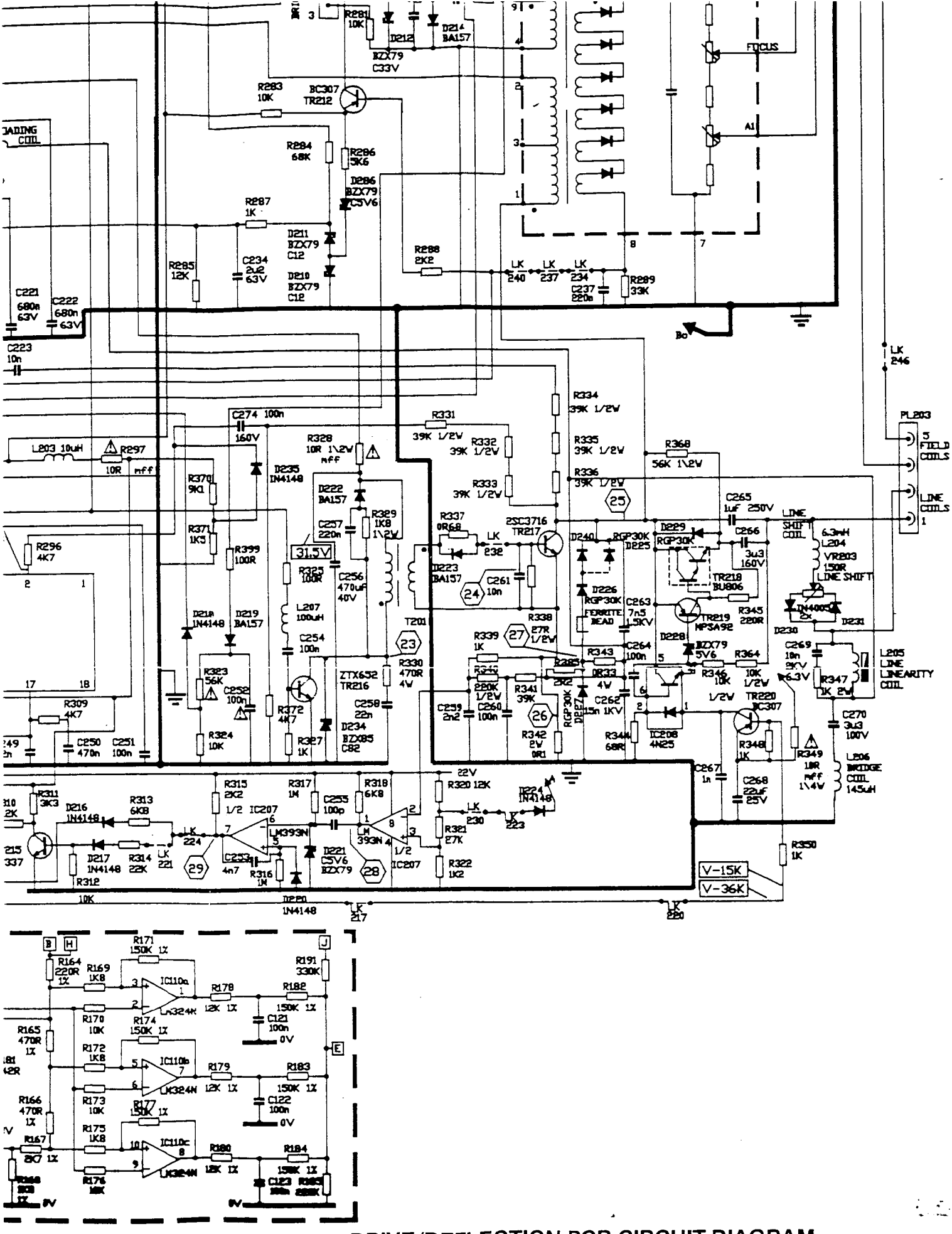



PL202
INTERFACE
PULSES/PRESET
CONNECTIONS
V.B
HT
V SHIFT
0V
12V
WIDTH
H.B
H PHASE
VIDEO
VSC26950
VS
0V
SC
/H SYNC
LK 214
(R373) 47n
IC200 TDA 8176
R200 470R
D201 1N4148
C200 47n
R201 1K
R202 1K
C201 100n
TR200 BC337
R204 390K
R205 3K3
C204 100uF 25V
R206 1K
R207 39K
C279 100n
TR201 2N4123
R209 3M3
R210 680K
C203 1uF 50V
C202 100n
R203 1K
R369 820R 1\2W
R155 390K
TR107 J112
R156 470K
C106 470n
R139 10K
1/4 LM324
IC101a
R138 10K
IC101b
R151 LINK
R303 10R mff
R304 4K7
IC209 1\2 LM393
C244 100n
PHASE
Disc ref
R140 68K
TR108 J112
R159 820K
R158 270K
TR110 BC337
R149 100K
C117 22n
TR106 2N7000
R145 1K5
TR103 2N4123
C101 2n2
R102 1K
R101 1K
R103 560R
LK 204
LK 207
LK 216
SYNC IN
12V
0V

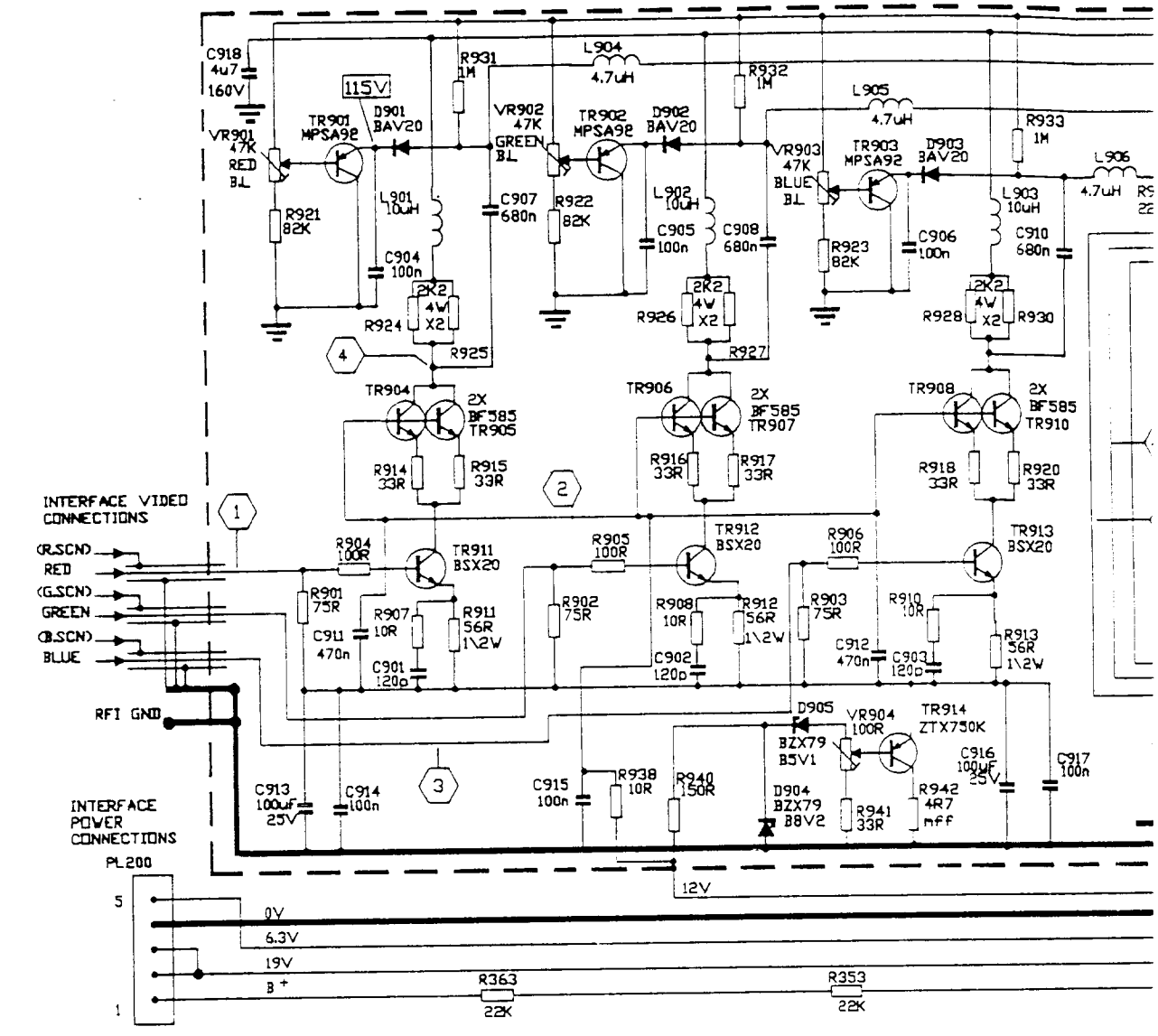


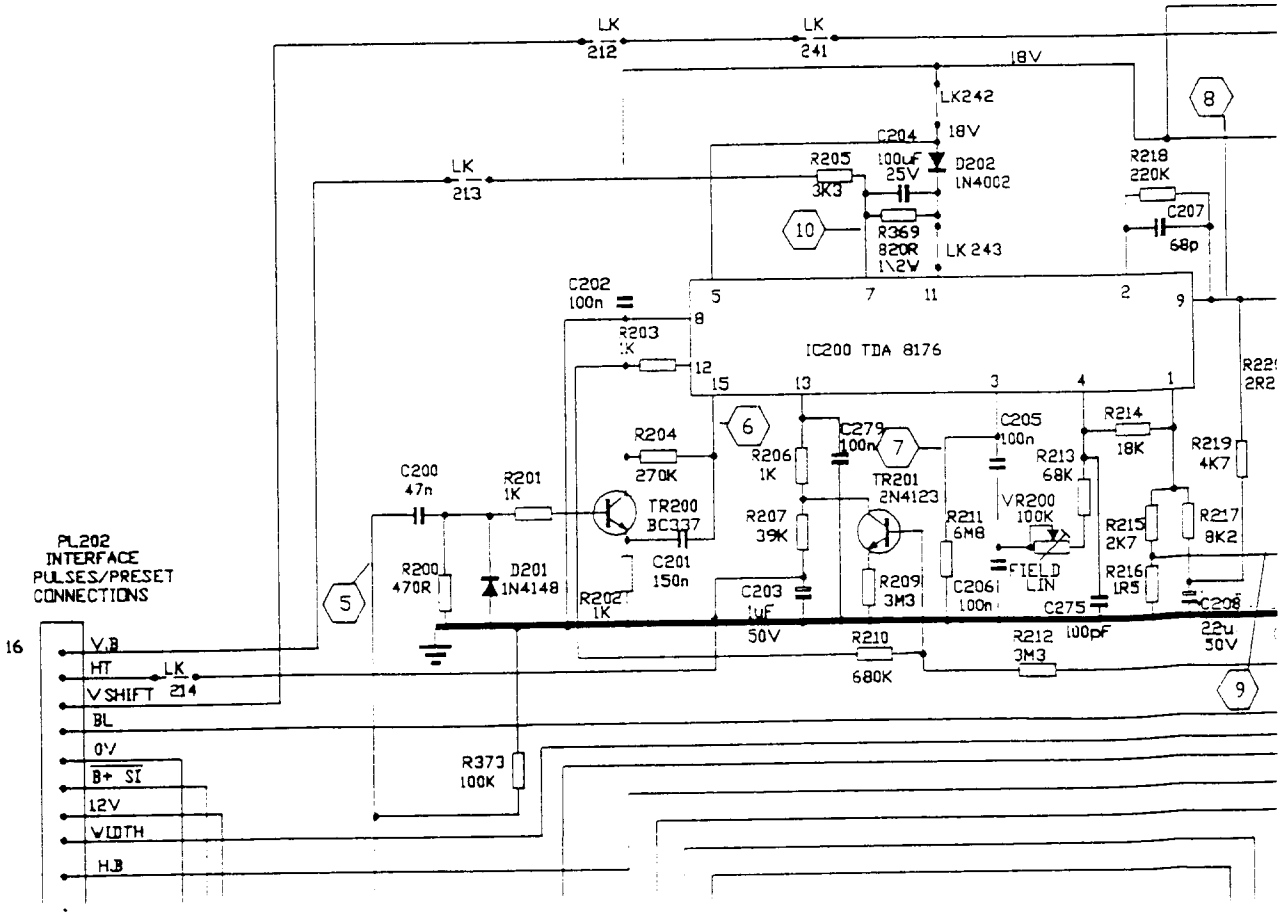
* Apply video signal w
horizontal frequenc
and set VR186 to
to low (1V) transiti

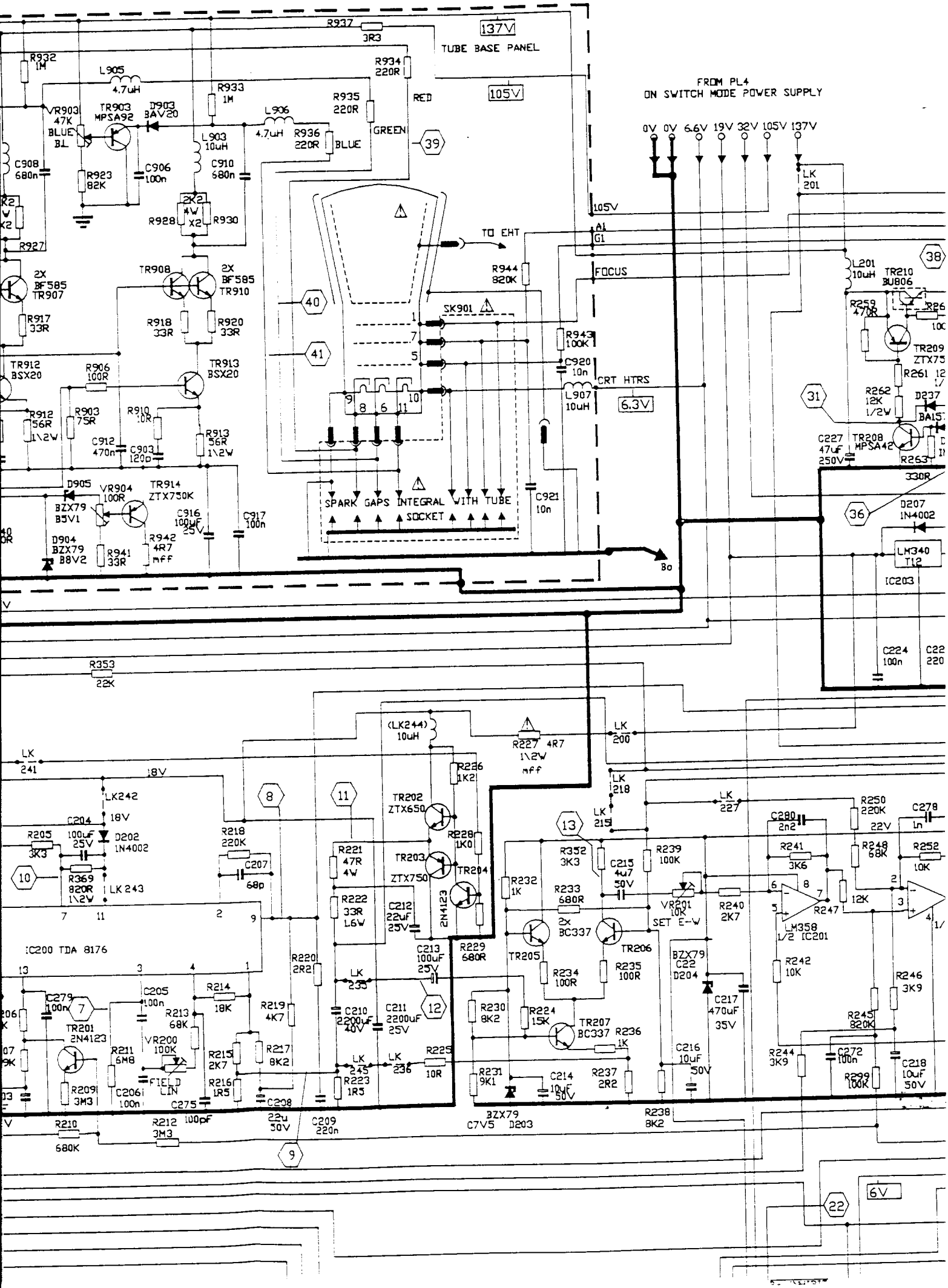

PANORAMIC SYNC SUB PCB
MULTIBAND PCB
TDA 2595 IC 206
IC202 TDA 4950
E-W LOADING COIL
* Apply video signal with a horizontal frequency of 34.5KHz and set VR186 to give a high (18V) to low (1V) transition at pin of IC110a.

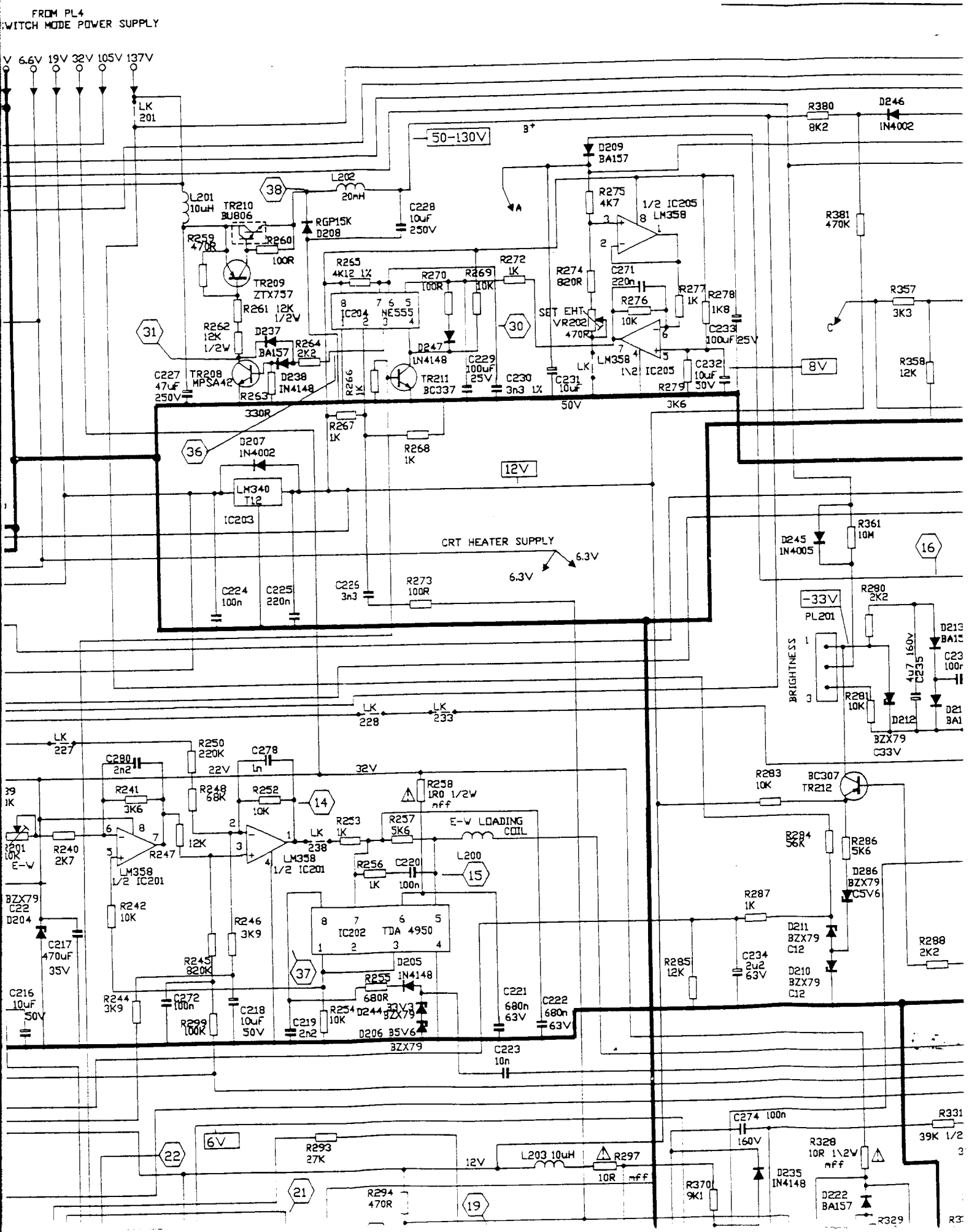


DRIVE/DEFLECTION PCB CIRCUIT DIAGRAM
(12L71DNS3)

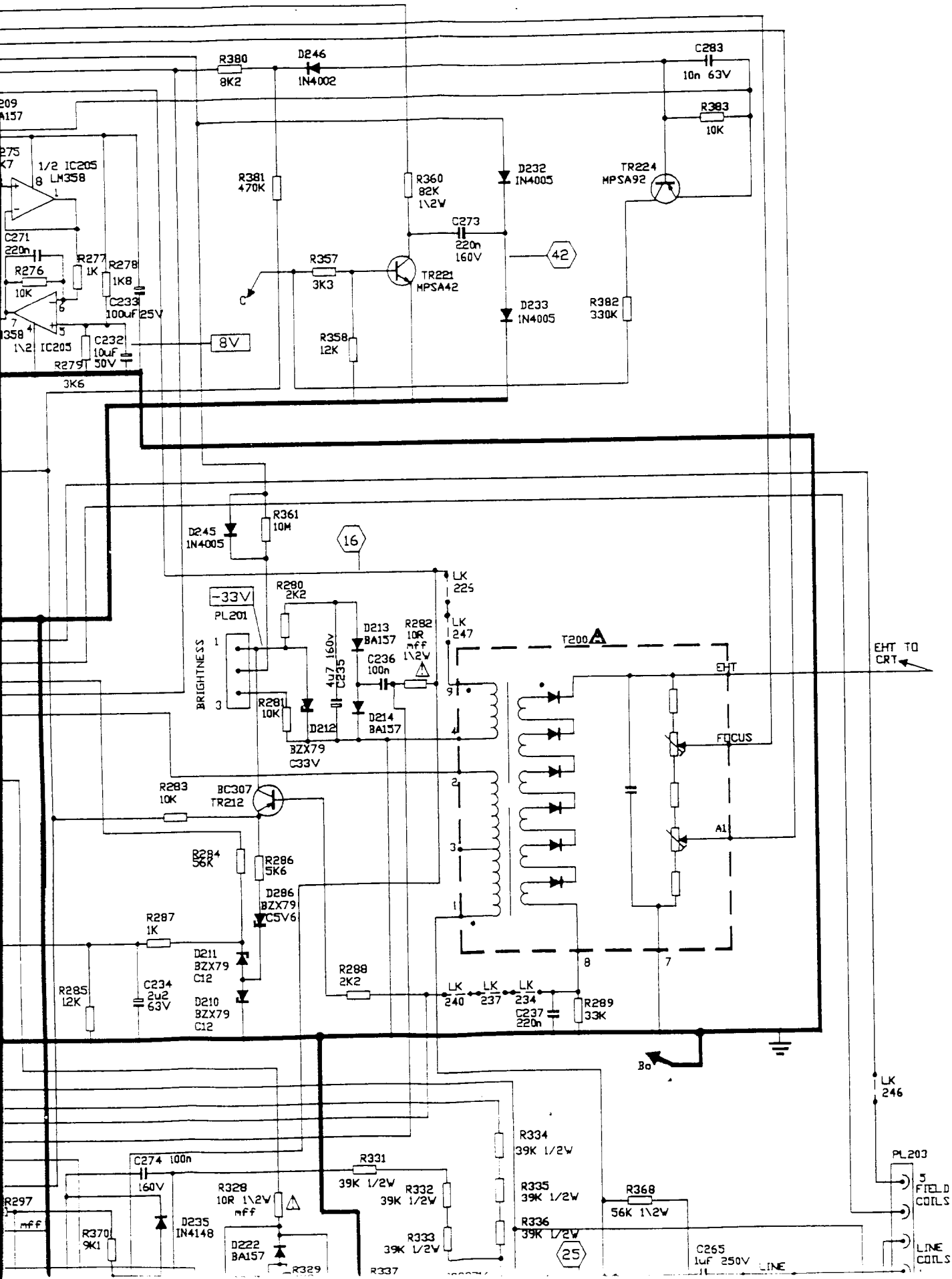

C918 4u7 160V
115V
R931 1M
L904 4.7uH
R932 1M
L905 4.7uH
R933 1M
L906 4.7uH
VR901 47K RED BL
TR901 MPSA92
D901 BAV20
VR902 47K GREEN BL
TR902 MPSA92
D902 BAV20
VR903 47K BLUE BL
TR903 MPSA92
D903 BAV20
R921 82K
L901 10uH
C904 100n
C907 680n
R922 82K
L902 10uH
C905 100n
C908 680n
R923 82K
C906 100n
L903 10uH
C910 680n
2K2 4W X2
R924
R925
R926
R927
R928
R930
TR904 2X BF585 TR905
TR906 2X BF585 TR907
TR908 2X BF585 TR910
R914 33R
R915 33R
R916 33R
R917 33R
R918 33R
R920 33R
INTERFACE VIDEO CONNECTIONS
(R.SCN)
RED
(G.SCN)
GREEN
(B.SCN)
BLUE
RFI GND
R904 100R
TR911 BSX20
R905 100R
TR912 BSX20
R906 100R
TR913 BSX20
R901 75R
C911 470n
R907 10R
R911 56R 1\2W
C901 120p
R902 75R
R908 10R
R912 56R 1\2W
C902 120p
R903 75R
R910 10R
C912 470n
C903 120p
R913 56R 1\2W
D905 BZX79 B5V1
VR904 100R
TR914 ZTX750K
C916 100uF 25V
C917 100n
D904 BZX79 B8V2
R941 33R
R942 4R7 mff
C913 100uF 25V
C914 100n
C915 100n
R938 10R
R940 150R
INTERFACE POWER CONNECTIONS
PL200
5
1
0V
6.3V
19V
B+
R363 22K
R353 22K
12V

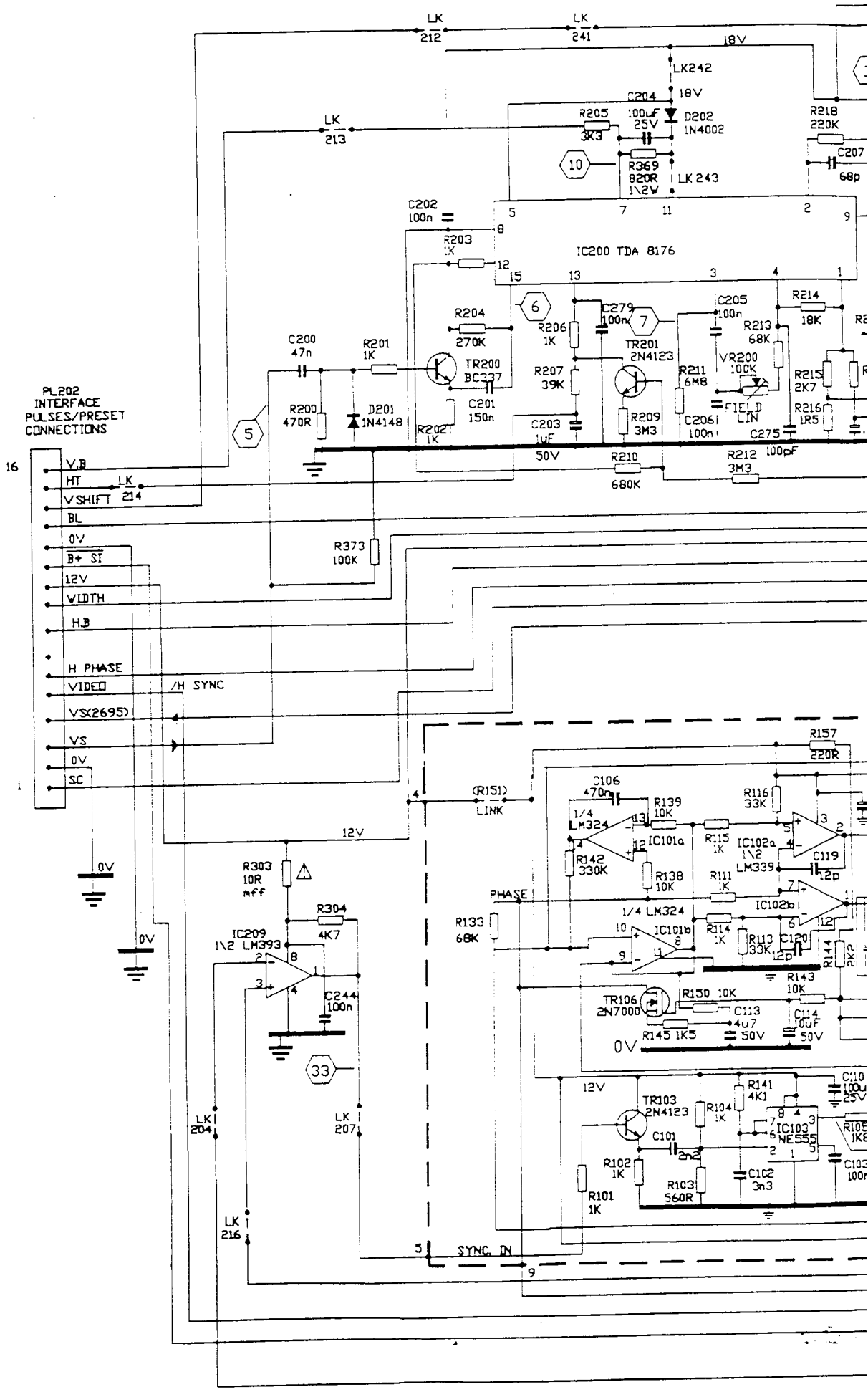

LK 212
LK 241
18V
LK242
C204
R205 3K3
100uF 25V
D202 1N4002
LK 213
R369 820R 1\2W
LK 243
R218 220K
C207 68p
C202 100n
R203 1K
IC200 TDA 8176
R204 270K
C279 100n
C205 100n
R214 18K
R219 4K7
C200 47n
R201 1K
TR200 BC337
R206 1K
TR201 2N4123
R213 68K
R207 39K
R211 6M8
VR200 100K
FIELD LIN
R215 2K7
R217 8K2
R200 470R
D201 1N4148
C201 150n
R202 1K
C203 1uF 50V
R209 3M3
C206 100n
R216 1R5
C275
C208 22u 50V
R210 680K
R212 3M3
100pF
PL202 INTERFACE PULSES/PRESET CONNECTIONS
16
V.B
HT
LK 214
V SHIFT
BL
0V
B+ SI
12V
WIDTH
H.B
R373 100K

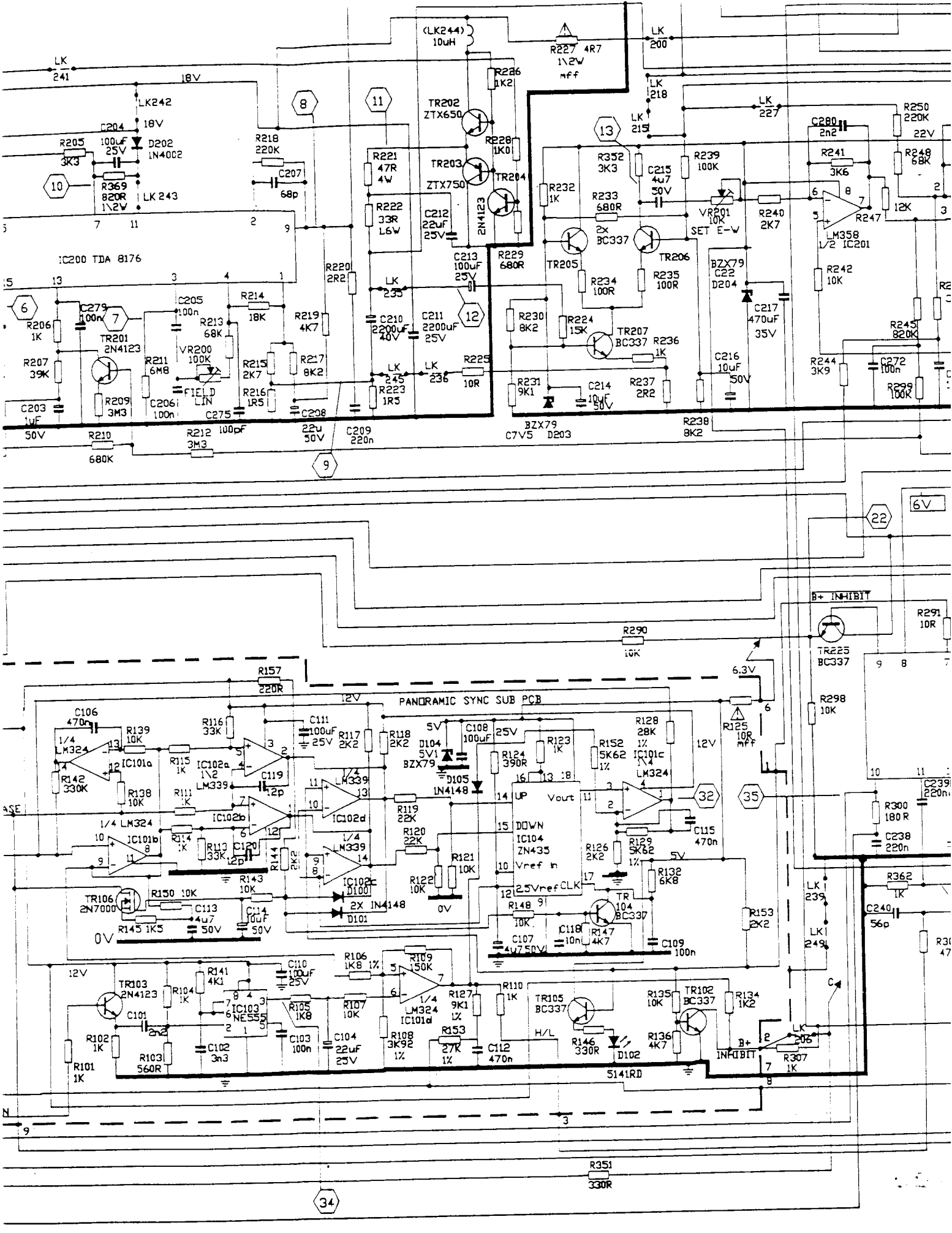

137V
TUBE BASE PANEL
105V
RED
GREEN
BLUE
FROM PL4
ON SWITCH MODE POWER SUPPLY
0V 0V 6.6V 19V 32V 105V 137V
TO EHT
FOCUS
CRT HTRS
6.3V
SPARK GAPS INTEGRAL WITH TUBE SOCKET
SK901
TR908
2X BF585 TR910
2X BF585 TR907
TR912 BSX20
TR913 BSX20
TR914 ZTX750K
VR903 47K
VR904 100R
TR903 MPSA92
D903 BAV20
D905 BZX79 B5V1
D904 BZX79 B8V2
TR202 ZTX650
TR203 ZTX750
TR204 2N4123
TR205
TR206
TR207 BC337
TR201 2N4123
TR208 MPSA42
TR209 ZTX75
TR210 BU806
2x BC337
VR200 100K FIELD LIN
VR201 10K SET E-W
IC200 TDA 8176
IC203 LM340 T12
LM358 1/2 IC201
D202 1N4002
D207 1N4002
BZX79 C7V5 D203
BZX79 C22 D204
L905 4.7uH
L906 4.7uH
L903 10uH
L907 10uH
L201 10uH
(LK244) 10uH
LK 241
LK 200
LK 201
LK 218
LK 215
LK 227
LK 233
LK 235
LK 236
LK 245
LK242
LK 243
18V
6V
8a

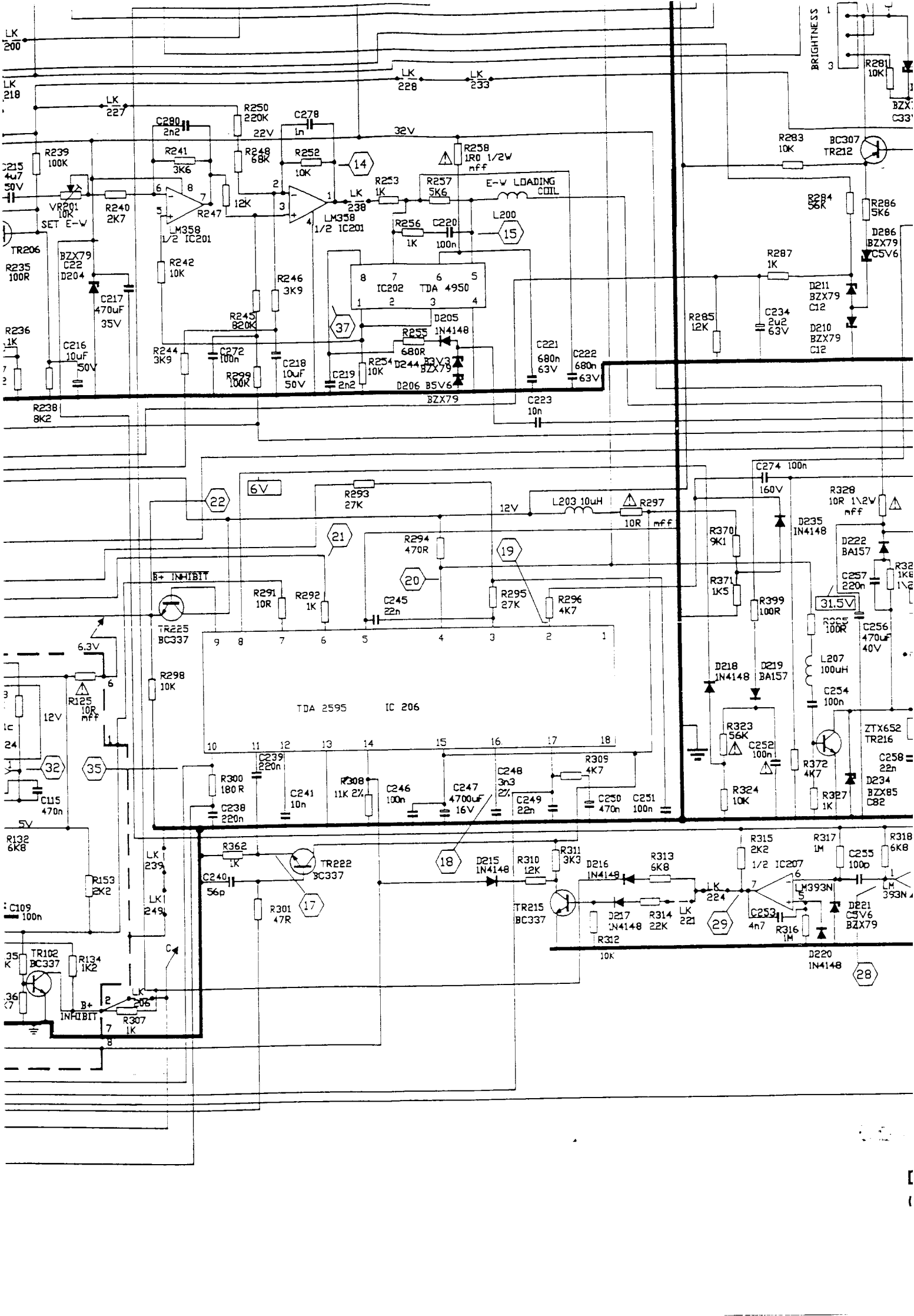

FROM PL4
SWITCH MODE POWER SUPPLY
V 6.6V 19V 32V 105V 137V
LK 201
50-130V
B+
D209 BA157
R380 8K2
D246 IN4002
L202 20mH
38
L201 10uH
TR210 BU806
RGP15K D208
C228 10uF 250V
R259 470R
R260 100R
TR209 ZTX757
R261 12K 1/2W
R262 12K 1/2W
31
D237 BA157
R264 2K2
C227 47uF 250V
TR208 MPSA42
D238 IN4148
R263 330R
R265 4K12 1%
R270 100R
R269 10K
R272 1K
IC204 NE555
30
D247 IN4148
TR211 BC337
C229 100uF 25V
C230 3n3 1%
R266 1K
R267 1K
R268 1K
R275 4K7
1/2 IC205 LM358
R274 820R
C271 220n
SET EHT VR202 470R
R276 10K
R277 1K
R278 1K8
C233 100uF 25V
LM358 1\2 IC205
C232 10uF 50V
C231 10uF 50V
LK
R279 3K6
8V
R381 470K
R357 3K3
R358 12K
C
36
D207 IN4002
LM340 T12
IC203
12V
CRT HEATER SUPPLY
6.3V
6.3V
C224 100n
C225 220n
C226 3n3
R273 100R
D245 IN4005
R361 10M
16
-33V
PL201
R280 2K2
BRIGHTNESS
C235 4u7 160V
D212 BZX79 C33V
R281 10K
LK 228
LK 233
LK 227
C280 2n2
R250 220K
22V
C278 1n
32V
R241 3K6
R248 68K
R252 10K
14
R238 1R0 1/2W mff
R253 1K
R257 5K6
E-W LOADING COIL
R283 10K
BC307 TR212
R284 56K
R286 5K6
D286 BZX79 C5V6
R240 2K7
R247 12K
LM358 1/2 IC201
R256 1K
C220 100n
L200
15
R287 1K
D211 BZX79 C12
D210 BZX79 C12
R288 2K2
R285 12K
C234 2u2 63V
BZX79 C22 D204
C217 470uF 35V
R242 10K
R246 3K9
IC202 TDA 4950
R245 820K
37
D205 1N4148
R255 680R
D244 BZX79 33V3
D206 BZX79 B5V6
C221 680n 63V
C222 680n 63V
C216 10uF 50V
R244 3K9
C272 100n
R299 100K
C218 10uF 50V
C219 2n2
R254 10K
C223 10n
C274 100n 160V
R331 39K 1/2
R328 10R 1\2W mff
D235 IN4148
D222 BA157
R370 9K1
R329
22
6V
R293 27K
12V
L203 10uH
R297 10R mff
21
R294 470R
19

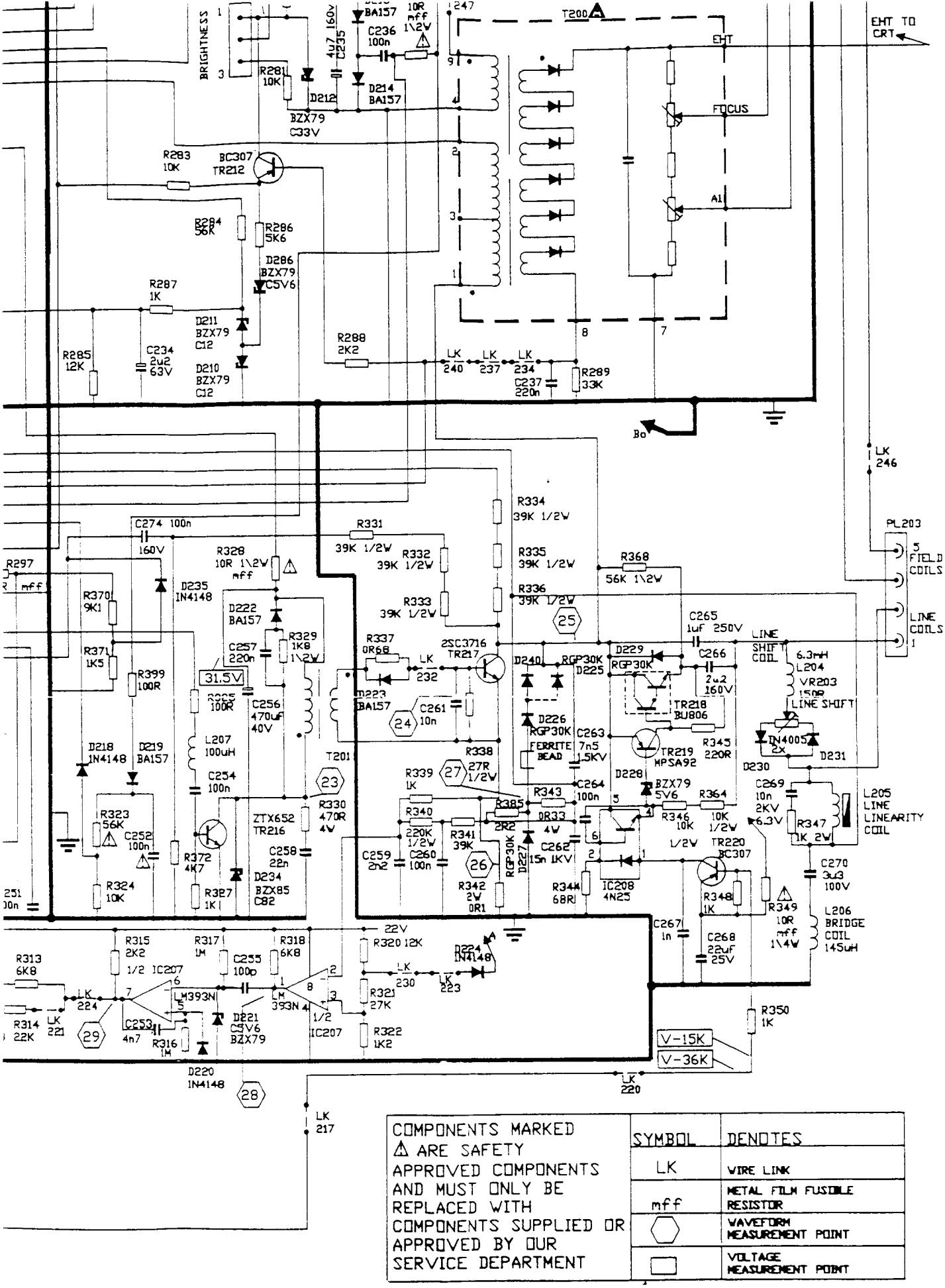
SERIES 7 MK2: DRIVE/DEFLECTION PCB




PL202
INTERFACE
PULSES/PRESET
CONNECTIONS
V.B
HT
VSHIFT
BL
0V
B+ SI
12V
WIDTH
H.B
H PHASE
VIDEO
VS(2695)
VS
0V
SC
/H SYNC
LK 214
LK 212
LK 241
LK 213
LK 216
LK 204
LK 207
LK242
LK 243
18V
IC200 TDA 8176
R203 1K
R204 270K
R206 1K
R207 39K
R209 3M3
R210 680K
R211 6M8
R212 100pF
R213 68K
R214 18K
R215 2K7
R216 1R5
R218 220K
R201 1K
R202 1K
R205 3K3
R369 820R 1\2W
R373 100K
C200 47n
C201 150n
C202 100n
C203 1uF 50V
C204 100uF 25V
C205 100n
C206 100n
C207 68p
C275
C279 100n
D201 1N4148
D202 1N4002
TR200 BC337
TR201 2N4123
VR200 100K
FIELD LIN
R303 10R
R304 4K7
IC209 1\2 LM393
C244 100n
R157 220R
(R151) LINK
C106 470n
R139 10K
R116 33K
1/4 LM324
IC101a
R142 330K
R138 10K
R115 1K
IC102a 1\2 LM339
C119 12p
R111 1K
PHASE
R133 68K
IC102b
1/4 LM324
IC101b
R114 1K
R113 33K
C120 12p
R143 10K
TR106 2N7000
R150 10K
C113 4u7 50V
C114 10uF 50V
R145 1K5
TR103 2N4123
R104 1K
R141 4K1
IC103 NE555
C101 2n2
R102 1K
R103 560R
C102 3n3
R101 1K
C110
C103
SYNC. IN

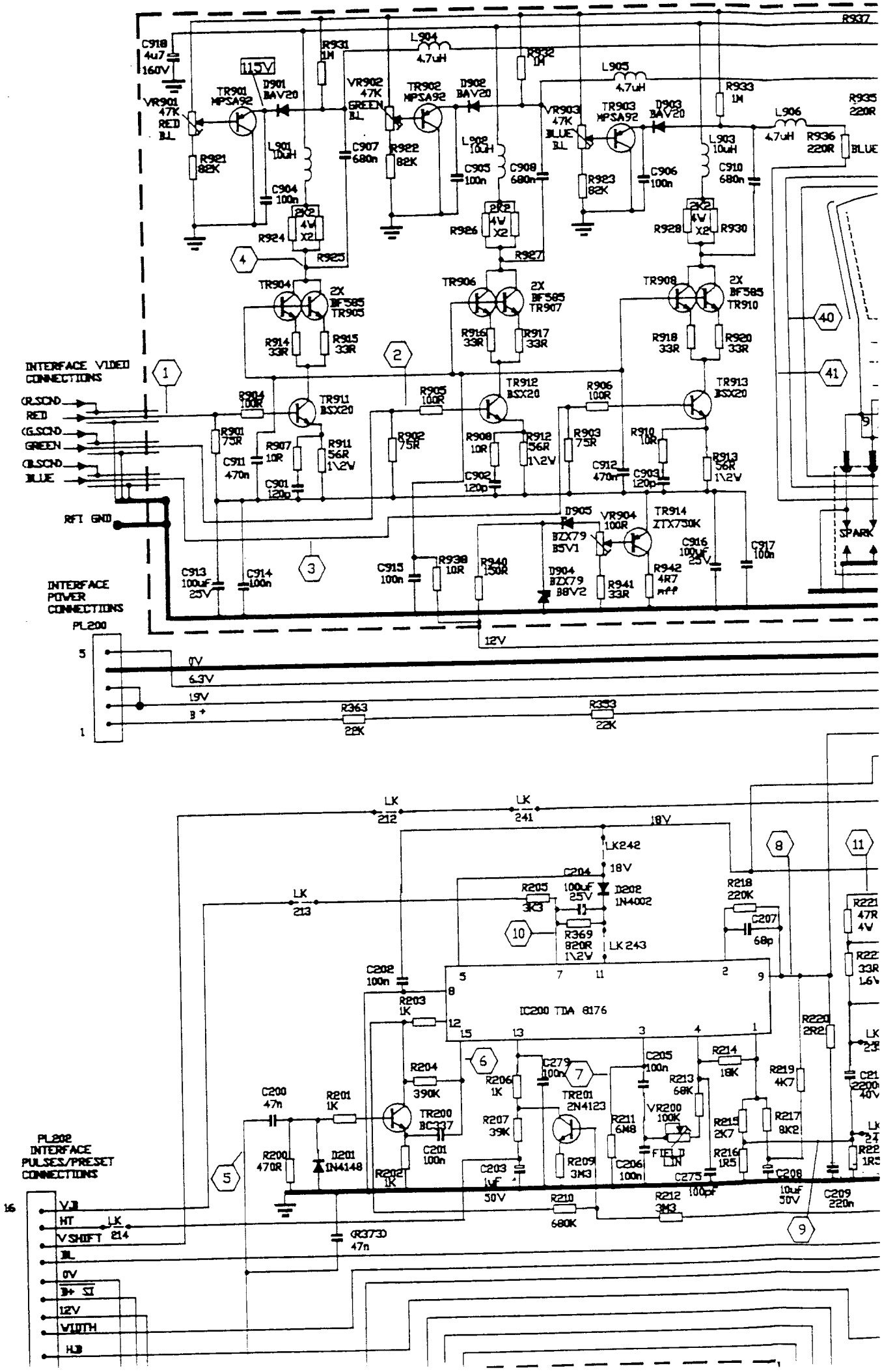

PANORAMIC SYNC SUB PCB
IC200 TDA 8176
18V
12V
6V
6.3V
0V
LK 241
LK242
LK 243
LK 200
LK 218
LK 215
LK 227
LK 235
LK 245
LK 236
LK 239
LK 249
LK 205
R205 3K3
C204 100uF 25V
D202 1N4002
R369 820R 1\2W
R218 220K
C207 68p
R221 47R 4W
R222 33R L6W
R220 2R2
C212 22uF 25V
C213 100uF 25V
R229 680R
(LK244) 10uH
R227 4R7 1\2W mff
R226 1K2
TR202 ZTX650
R228 1K0
TR203 ZTX750
TR204 2N4123
R232 1K
R233 680R
R352 3K3
C215 4u7 50V
R239 100K
VR201 10K SET E-W
R240 2K7
2x BC337
TR205
TR206
R234 100R
R235 100R
BZX79 C22 D204
C217 470uF 35V
R230 8K2
R224 15K
TR207 BC337
R236 1K
R231 9K1
C214 10uF 50V
R237 2R2
C216 10uF 50V
R238 8K2
BZX79 C7V5 D203
R250 220K
C280 2n2
R241 3K6
R248 68K
LM358 1/2 IC201
R247 12K
R242 10K
R244 3K9
C272 100n
R245 820K
R299 100K
C279 100n
R206 1K
TR201 2N4123
R207 39K
R209 3M3
C203 1uF 50V
C205 100n
R213 68K
VR200 100K FIELD LIN
R211 6M8
C206 100n
C275
R214 18K
R215 2K7
R216 1R5
R217 8K2
R219 4K7
C208
R223 1R5
C210 2200uF 40V
C211 2200uF 25V
R225 10R
R210 680K
R212 100pF 3M3
22u 50V
C209 220n
R290 10K
B+ INHIBIT
TR225 BC337
R291 10R
R298 10K
R157 220R
R125 10R mff
C106 470n
R139 10K
R116 33K
C111 100uF 25V
R117 2K2
R118 2K2
C108 100uF 25V
D104 5V1 BZX79
D105 1N4148
R123 1K
R124 390R
R152 5K62 1%
R128 28K 1%
IC101a 1/4 LM324
IC102a 1\2 LM339
C119 12p
IC102d 1/4 LM339
R119 22K
IC102b 1/4 LM324
IC101b 1/4 LM324
R111 1K
R114 1K
R113 33K
C120 12p
R144 2K2
R120 22K
R121 10K
R122 10K
IC102c 1/4 LM339
D100 2X IN4148
D101
IC104 ZN435
UP
DOWN
Vout
Vref in
2.5Vref
CLK
R126 2K2
R129 5K62 1%
R132 6K8
R148 10K
TR 104 BC337
R147 4K7
C118 10nF
C107 4u7 50V
C109 100n
R153 2K2
C115 470n
R300 180R
C238 220n
C239 220n
R362 1K
C240 56p
R150 10K
TR106 2N7000
C113 4u7 50V
C114 10uF 50V
R145 1K5
R143 10K
R141 4K1
C110 100uF 25V
R106 1K8 1%
R109 150K
IC101d 1/4 LM324
R127 9K1 1%
R110 1K
TR103 2N4123
R104 1K
C101 2n2
IC103 NE555
R105 1K8
R107 10K
R108 3K92 1%
R153 27K 1%
C112 470n
C103 100n
C104 22uF 25V
C102 3n3
R102 1K
R103 560R
R101 1K
TR105 BC337
H/L
R146 330R
D102
R135 10K
TR102 BC337
R134 1K2
R136 4K7
B+ INHIBIT
R307 1K
5141RD
R351 330R
22
32
35
34
6
7
8
9
10
11
12
13

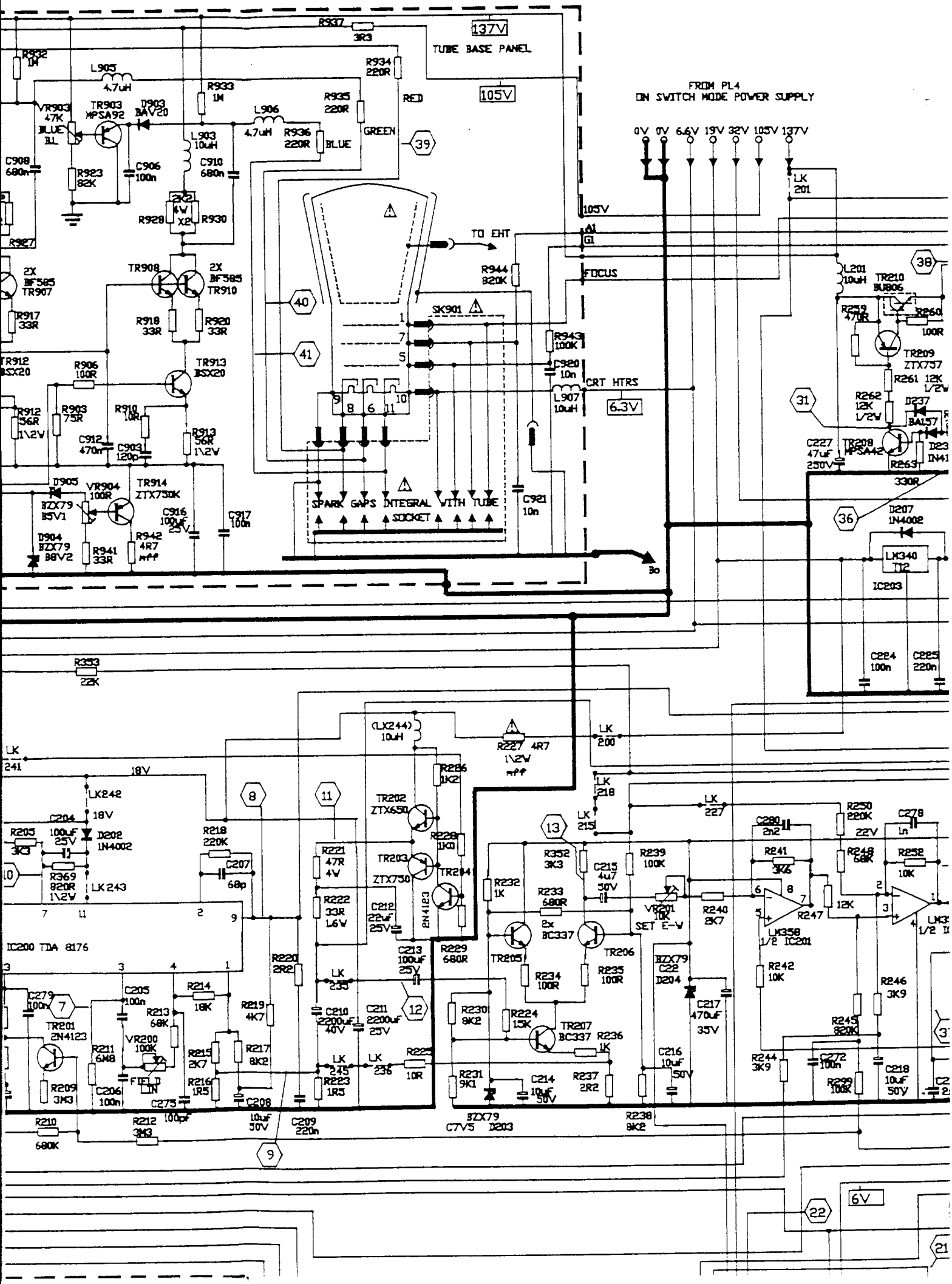

BRIGHTNESS
R281 10K
LK 200
LK 218
LK 227
LK 228
LK 233
C280 2n2
R250 220K
C278 1n
22V
32V
R239 100K
R241 3K6
R248 68K
R252 10K
14
R258 1R0 1/2W mff
R283 10K
BC307 TR212
C215 4u7 50V
VR201 10K SET E-W
R240 2K7
R247 12K
LM358 1/2 IC201
R253 1K
R257 5K6
E-W LOADING COIL
LK 238
R284 56K
R286 5K6
D286 BZX79 C5V6
TR206
R235 100R
BZX79 C22 D204
C217 470uF 35V
R256 1K
C220 100n
L200
15
R287 1K
R242 10K
R246 3K9
IC202 TDA 4950
R245 820K
37
D205 1N4148
R255 680R
D211 BZX79 C12
R285 12K
C234 2u2 63V
D210 BZX79 C12
R236 1K
C216 10uF 50V
R244 3K9
C272 100n
R299 100K
C218 10uF 50V
C219 2n2
R254 10K
D244 B3V3 BZX79
D206 B5V6 BZX79
C221 680n 63V
C222 680n 63V
C223 10n
R238 8K2
C274 100n 160V
6V
22
R293 27K
12V
L203 10uH
R297 10R mff
R328 10R 1\2W mff
D235 IN4148
21
R294 470R
19
R370 9K1
D222 BA157
B+ INHIBIT
20
R291 10R
R292 1K
C245 22n
R295 27K
R296 4K7
R371 1K5
C257 220n
31.5V
R399 100R
TR225 BC337
9 8 7 6 5 4 3 2 1
C256 470uF 40V
6.3V
R125 10R mff
R298 10K
TDA 2595 IC 206
D218 1N4148
D219 BA157
L207 100uH
C254 100n
10 11 12 13 14 15 16 17 18
R323 56K
C252 100n
ZTX652 TR216
C258 22n
12V
32
35
C239 220n
R300 180 R
C241 10n
R308 11K 2%
C246 100n
C247 4700uF 16V
C248 3n3 2%
R309 4K7
R372 4K7
D234 BZX85 C82
R324 10K
R327 1K
C115 470n
C238 220n
C249 22n
C250 470n
C251 100n
5V
R132 6K8
R362 1K
TR222 BC337
C240 56p
18
D215 1N4148
R310 12K
R311 3K3
D216 1N4148
R313 6K8
R315 2K2
1/2 IC207
R317 1M
C255 100p
R318 6K8
LK 239
R153 2K2
LK 249
R301 47R
17
TR215 BC337
D217 1N4148
R314 22K
LK 221
LK 224
29
C253 4n7
R316 1M
LM393N
D221 C5V6 BZX79
C109 100n
R312 10K
D220 IN4148
28
TR102 BC337
R134 1K2
LK 206
B+ INHIBIT
R307 1K

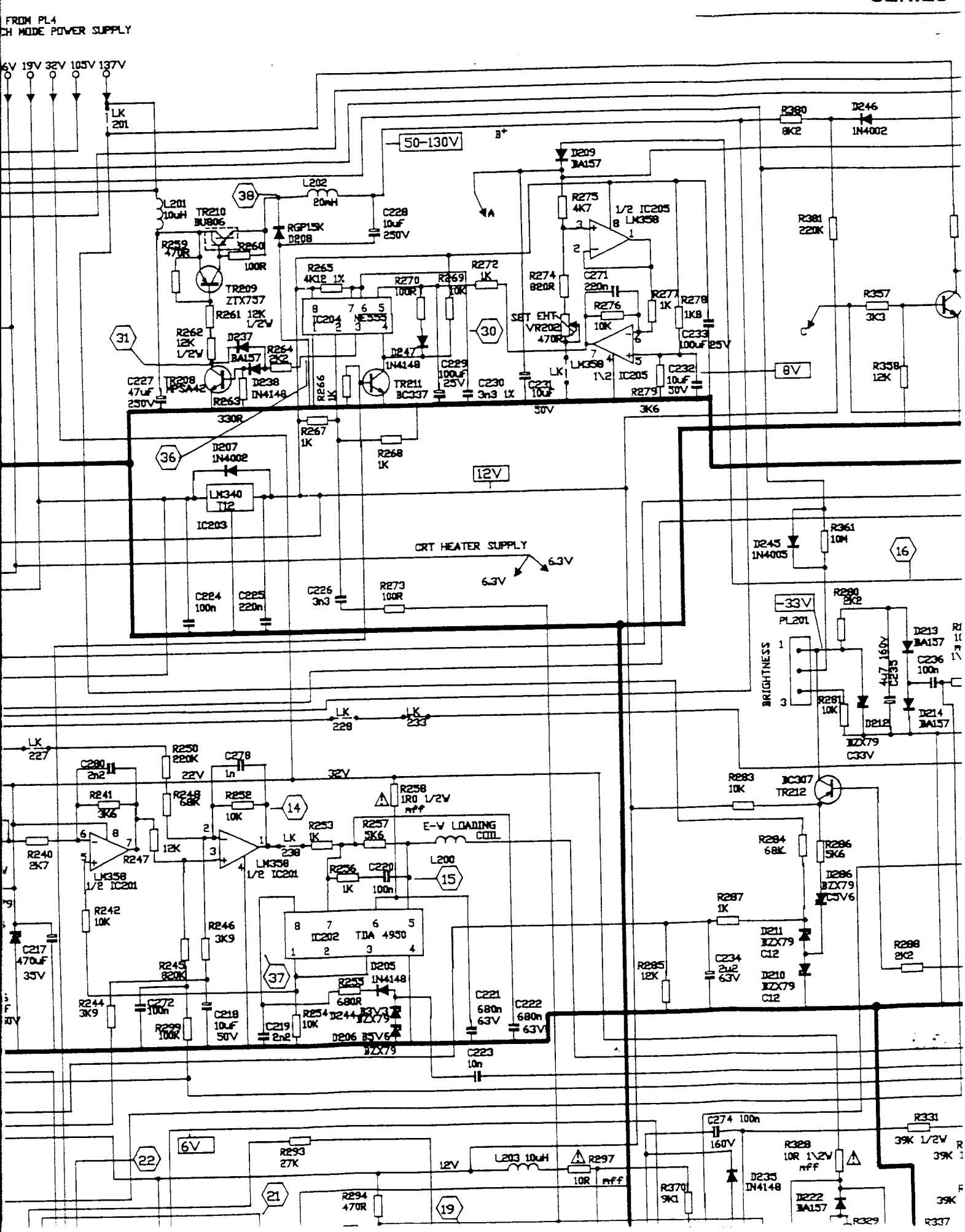


COMPONENTS MARKED ⚠ ARE SAFETY APPROVED COMPONENTS AND MUST ONLY BE REPLACED WITH COMPONENTS SUPPLIED OR APPROVED BY OUR SERVICE DEPARTMENT	SYMBOL	DENOTES
	LK	WIRE LINK
	mff	METAL FILM FUSIBLE RESISTOR
	⬡	WAVEFORM MEASUREMENT POINT
	▭	VOLTAGE MEASUREMENT POINT

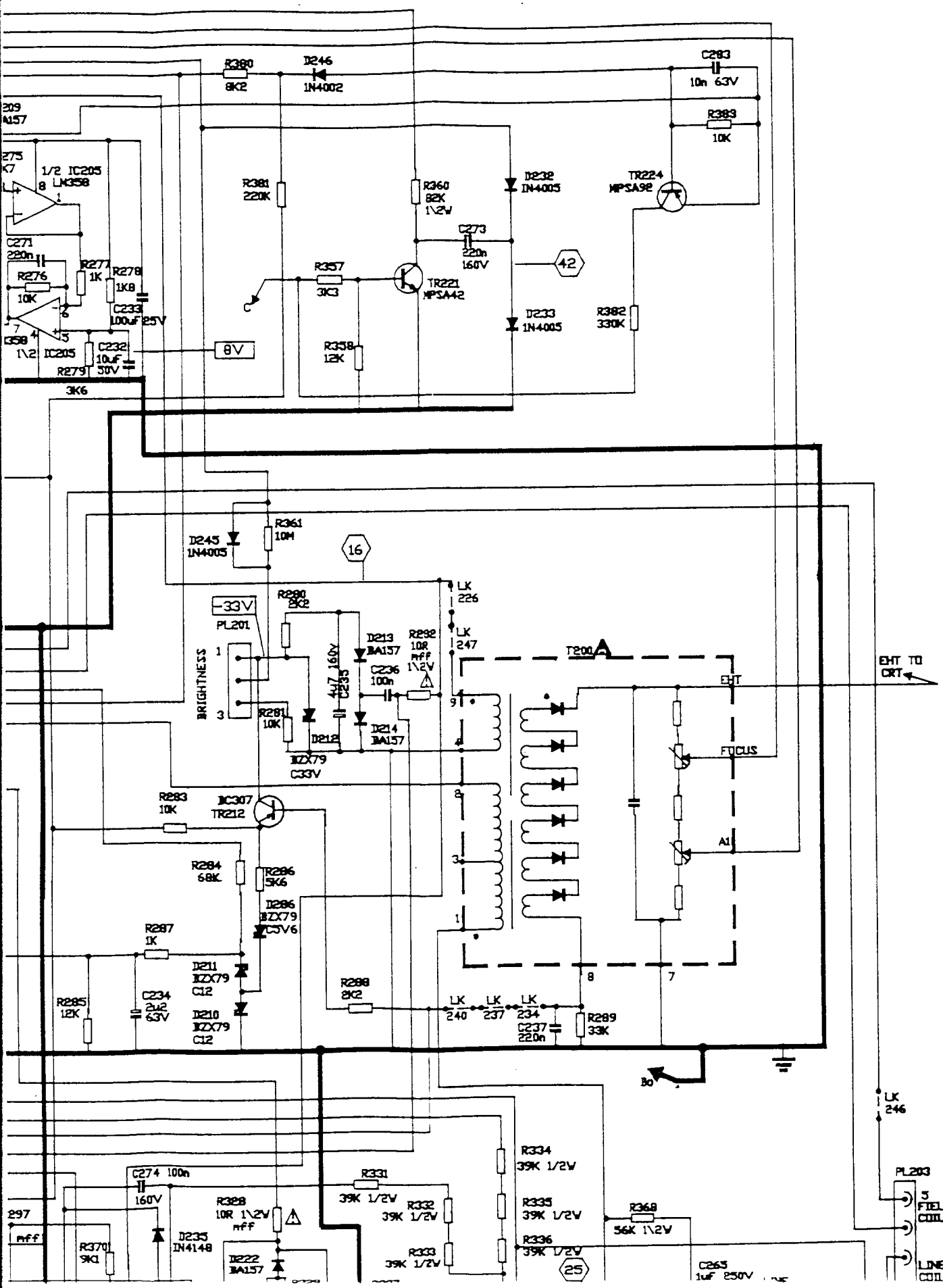
DRIVE/DEFLECTION PCB CIRCUIT DIAGRAM (604/704)

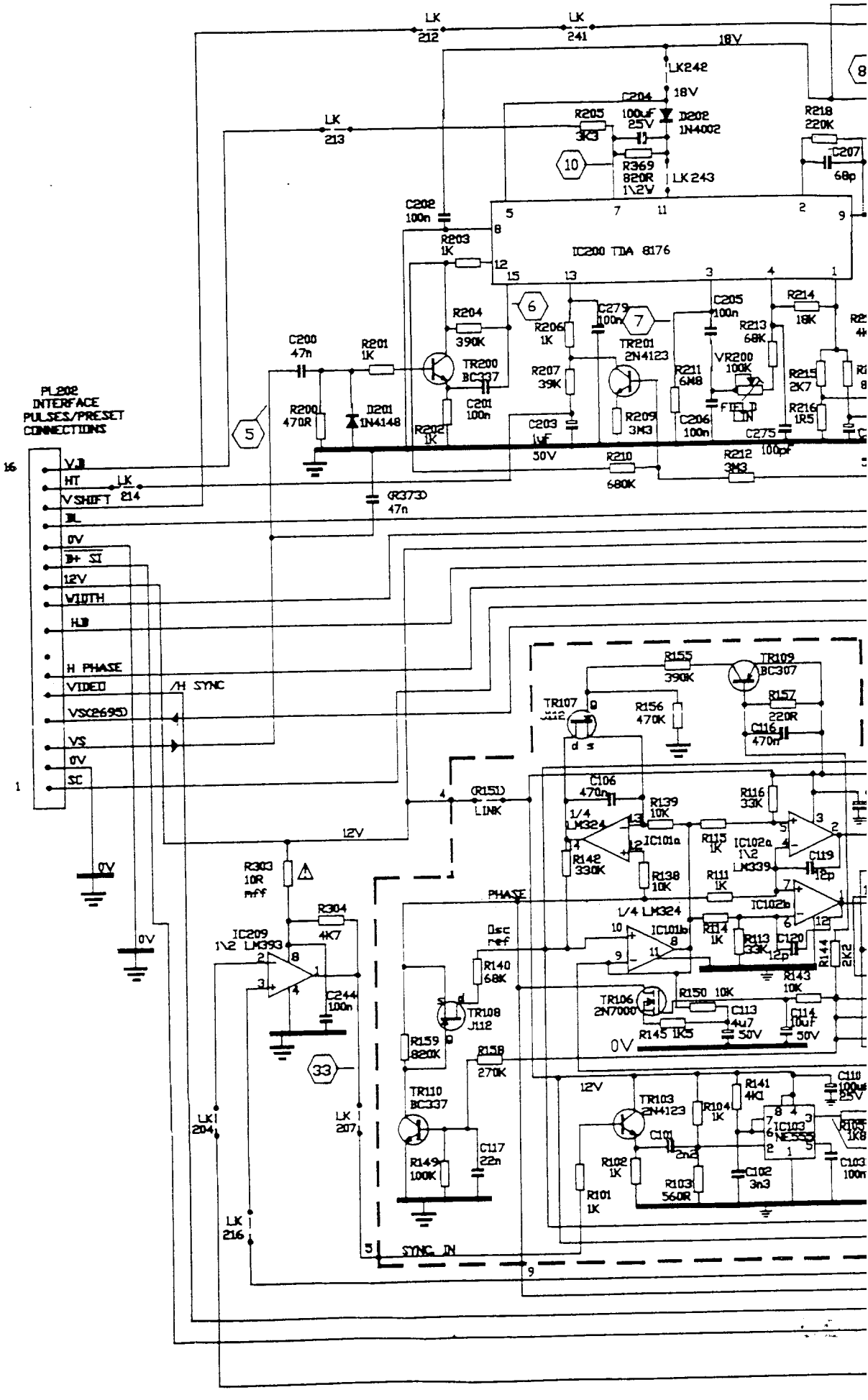

INTERFACE VIDEO CONNECTIONS
R.SCND
RED
G.SCND
GREEN
B.SCND
BLUE
RFI GND
INTERFACE POWER CONNECTIONS
PL200
0V
6.3V
19V
B+
12V
PL202 INTERFACE PULSES/PRESET CONNECTIONS
V.B
HT
V SHIFT
H.B
0V
B+ SI
12V
WIDTH
H.B
IC200 TDA 8176
TR901 MPSA92
TR902 MPSA92
TR903 MPSA92
TR904 2X BF585 TR905
TR906 2X BF585 TR907
TR908 2X BF585 TR910
TR911 BSX20
TR912 BSX20
TR913 BSX20
TR914 ZTX750K
TR200 BC337
TR201 2N4123
D901 BAV20
D902 BAV20
D903 BAV20
D904 BZX79 B8V2
D905 BZX79 B5V1
D201 1N4148
D202 1N4002
VR901 47K RED
VR902 47K GREEN
VR903 47K BLUE
VR904 100R
VR200 100K
FIELD LIN
L904 4.7uH
L905 4.7uH
L906 4.7uH
SPARK
LK 212
LK 241
LK 213
LK 214
LK242
LK 243
18V
115V
12V

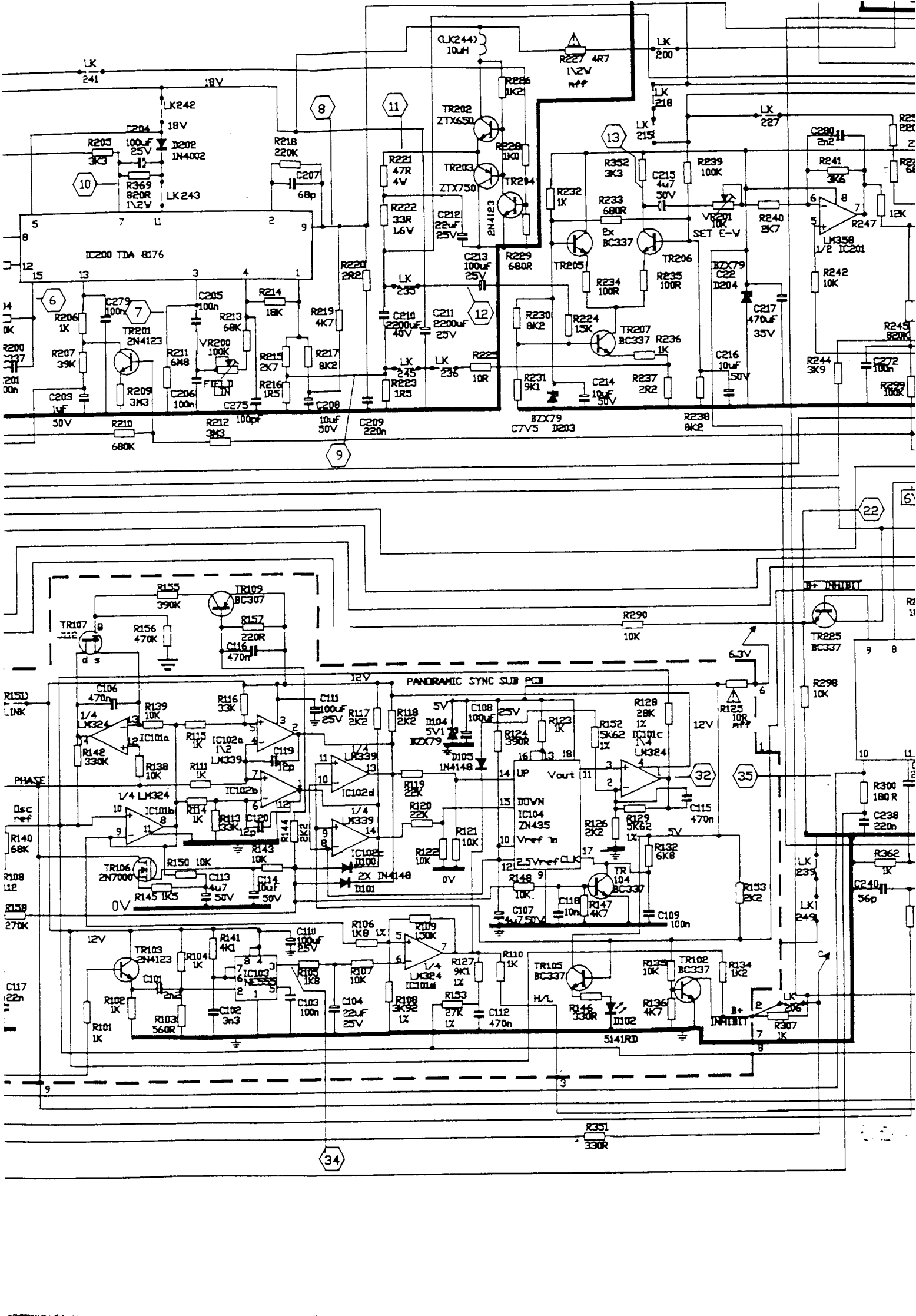

137V
TUBE BASE PANEL
105V
FROM PL4
ON SWITCH MODE POWER SUPPLY
0V 0V 6.6V 19V 32V 105V 137V
TO EHT
FOCUS
SK901
CRT HTRS
6.3V
SPARK GAPS INTEGRAL WITH TUBE SOCKET
R937 3R3
R934 220R
R935 220R
R936 220R
L905 4.7uH
L906 4.7uH
L903 10uH
R933 1M
R932 1M
VR903 47K
TR903 MPSA92
D903 BAV20
C908 680n
C906 100n
C910 680n
R923 82K
R928 2K2 4W X2
R930
R927
TR908 2X BF585
TR907 2X BF585
TR910
R917 33R
R918 33R
R920 33R
TR912 BSX20
TR913 BSX20
R906 100R
R912 56R 1\2W
R903 75R
R910 10R
R913 56R 1\2W
C912 470n
C903 120p
D905 BZX79 B5V1
VR904 100R
TR914 ZTX750K
C916 100uF 25V
C917 100n
D904 BZX79 B8V2
R941 33R
R942 4R7 mff
C921 10n
R944 820K
R943 100K
C920 10n
L907 10uH
L201 10uH
TR210 BU806
R259 47R
R260 100R
TR209 ZTX757
R261 12K 1/2W
R262 12K 1/2W
D237 BA157
C227 47uF 250V
TR208 MPSA42
R263 330R
D207 1N4002
LM340 T12
IC203
C224 100n
C225 220n
R353 22K
LK 241
18V
LK242
C204 100uF 25V
D202 1N4002
R205 3K3
R369 820R 1\2W
LK243
IC200 TDA 8176
R218 220K
C207 68p
R221 47R 4W
R222 33R 1W
R220 2R2
C212 22uF 25V
C213 100uF 25V
C210 2200uF 40V
C211 2200uF 25V
R223 1R5
R225 10R
LK 235
LK 236
LK 245
(LK244) 10uH
R227 4R7 1\2W mff
LK 200
LK 218
LK 215
LK 227
R226 1K2
TR202 ZTX650
R228 1K0
TR203 ZTX750
TR204 2N4123
R229 680R
R232 1K
R233 680R
TR205
TR206
2x BC337
R234 100R
R235 100R
R352 3K3
C215 4u7 50V
R239 100K
VR201 10K SET E-W
R240 2K7
R230 8K2
R224 15K
TR207 BC337
R236 1K
R231 9K1
C214 10uF 50V
R237 2R2
C216 10uF 50V
BZX79 C7V5 D203
R238 8K2
C217 470uF 35V
BZX79 C22 D204
C280 2n2
R241 3K6
R247
LM358 1/2 IC201
R250 220K 22V
C278 1n
R248 68K
R252 10K
R242 10K
R246 3K9
R245 820K
R244 3K9
C272 100n
C218 10uF 50V
R299 100K
TR201 2N4123
C279 100n
C205 100n
R214 18K
R213 68K
VR200 100K FIELD LIN
R211 6M8
R209 3M3
C206 100n
R215 2K7
R216 1R5
R217 8K2
R219 4K7
C208
C275 100pF
R210 680K
R212 3M3
10uF 50V
C209 220n
6V
22
21
9
8
11
12
13
10
7
38
31
36
40
41
39
Bo
A1
G1

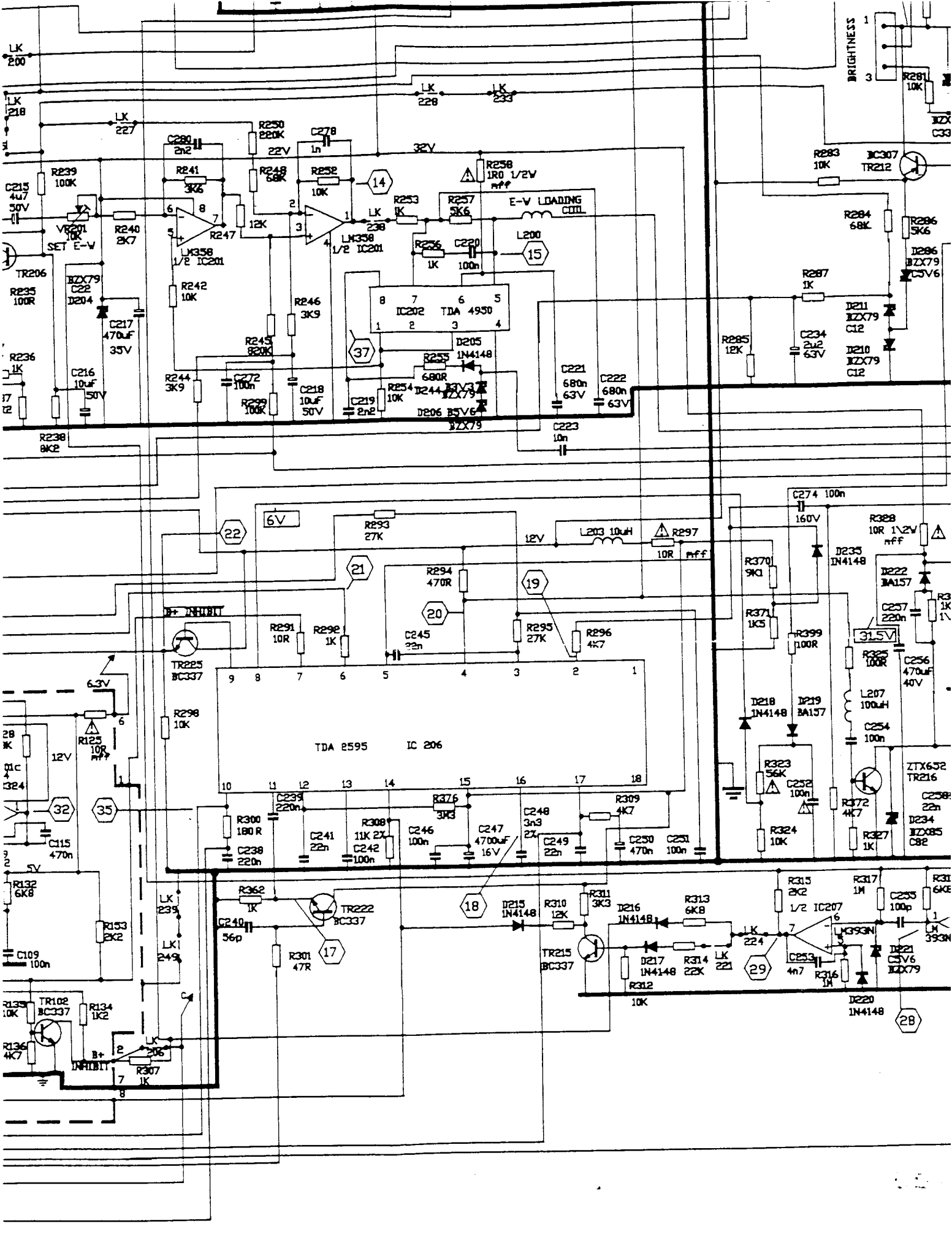

FROM PL4
CH MODE POWER SUPPLY
6V 19V 32V 105V 137V
LK 201
50-130V
B+
L201 10uH
TR210 BU806
RGP15K D208
L202 20mH
C228 10uF 250V
D209 BA157
R275 4K7
1/2 IC205 LM358
R380 8K2
D246 1N4002
R381 220K
R357 3K3
R358 12K
R259 470R
R260 100R
TR209 ZTX757
R261 12K 1/2W
R262 12K 1/2W
R263 330R
R264 2K2
D237 BA157
D238 IN4148
TR208 MPSA42
C227 47uF 250V
R265 4K12 1%
R270 100R
R269 10K
R272 1K
IC204 NE555
D247 1N4148
TR211 BC337
C229 100uF 25V
C230 3n3 1%
R266 2K
R274 820R
C271 220n
R276 10K
SET EHT VR202 470R
R277 1K
R278 1K8
C233 100uF 25V
LM358 1\2 IC205
C232 10uF 50V
R279 3K6
C231 10uF 50V
8V
R267 1K
R268 1K
D207 1N4002
LM340 T12
IC203
12V
CRT HEATER SUPPLY
6.3V
C224 100n
C225 220n
C226 3n3
R273 100R
D245 1N4005
R361 10M
16
-33V
PL201
BRIGHTNESS
R280 8K2
D213 BA157
C236 100n
C235 4u7 160V
R281 10K
D212
D214 BA157
BZX79 C33V
LK 228
LK 233
LK 227
R250 220K
C278 1n
C280 2n2
22V
32V
R241 3K6
R248 68K
R252 10K
R258 1R0 1/2W mff
R283 10K
BC307 TR212
R253 1K
R257 5K6
E-W LOADING COIL
R240 2K7
R247 12K
LM358 1/2 IC201
R226 1K
C220 100n
L200
R284 68K
R286 5K6
D206 BZX79 C5V6
R242 10K
R246 3K9
IC202 TDA 4950
R287 1K
D211 BZX79 C12
D210 BZX79 C12
R288 8K2
C217 470uF 35V
R245 820K
D205 1N4148
R255 680R
R244 3K9
C272 100n
C218 10uF 50V
R299 100K
R254 10K
C219 2n2
D244 BZV79 C3V3
D206 BZV79 C5V6
C221 680n 63V
C222 680n 63V
C223 10n
R285 12K
C234 2u2 63V
C274 100n 160V
R331 39K 1/2W
R328 10R 1\2W mff
D235 IN4148
D222 BA157
R370 9K1
6V
R293 27K
12V
L203 10uH
R297 10R mff
R294 470R
R329
R337
39K
22
21
19
30
31
36
37
38
14
15

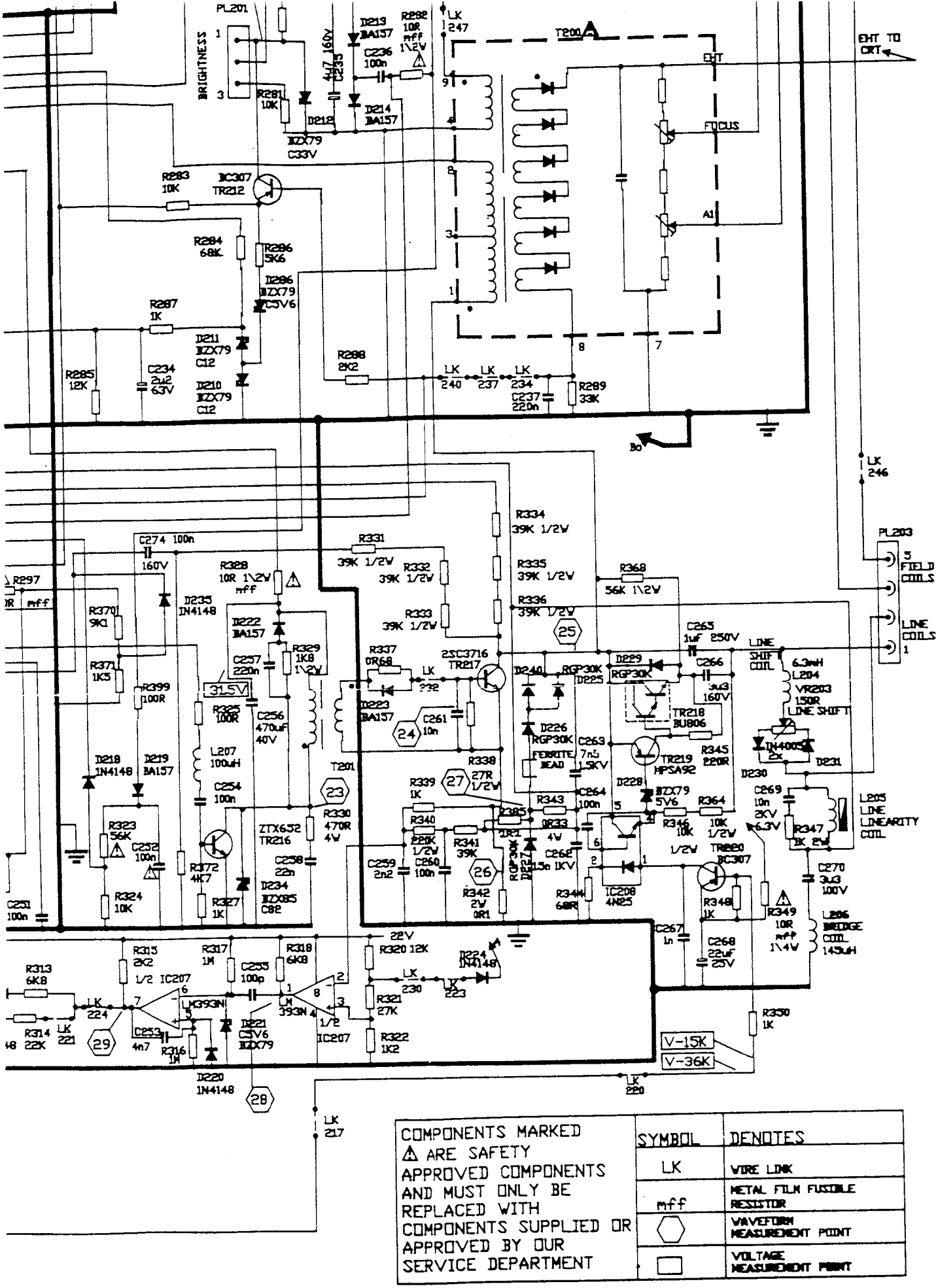
SERIES 7 MK2: DRIVE/DEFLECTION PCB




PL202
INTERFACE
PULSES/PRESET
CONNECTIONS
V.B
HT
VSHIFT
0V
B+ SI
12V
WIDTH
H.B
H PHASE
VIDEO
VSC26950
VS
0V
SC
/H SYNC
LK 212
LK 241
LK 213
LK 214
LK 204
LK 207
LK 216
18V
LK242
LK243
C204 100uF 25V
D202 1N4002
R205 3K3
R369 820R 1\2W
R218 220K
C207 68p
C202 100n
R203 1K
IC200 TDA 8176
R204 390K
R206 1K
C279 100n
C205 100n
R214 18K
R213 68K
VR200 100K
R211 6K8
R215 2K7
R216 1R5
C206 100n
C275 100pF
C200 47n
R201 1K
TR200 BC337
C201 100n
R200 470R
D201 1N4148
R202 1K
C203 1uF 50V
R207 39K
TR201 2N4123
R209 3M3
R210 680K
R212 3M3
C(R373) 47n
R155 390K
TR109 BC307
R157 220R
C116 470n
TR107 J112
R156 470K
C106 470n
(R151) LINK
R139 10K
1/4 LM324
IC101a
R142 330K
R138 10K
R116 33K
R115 1K
IC102a 1\2 LM339
C119 12p
R111 1K
IC102b
1/4 LM324
IC101b
R114 1K
R113 33K
C120 12p
R144 2K2
R143 10K
R303 10R
R304 4K7
IC209 1\2 LM393
C244 100n
PHASE
Osc ref
R140 68K
TR108 J112
R150 10K
TR106 2N7000
C113 4u7 50V
C114 10uF 50V
R145 1K5
R159 820K
R158 270K
TR110 BC337
R149 100K
C117 22n
R141 4K1
TR103 2N4123
R104 1K
C101 2n2
IC103 NE555
R102 1K
R103 560R
C102 3n3
R101 1K
C110 100n 25V
C103 100n
SYNC IN
12V
0V

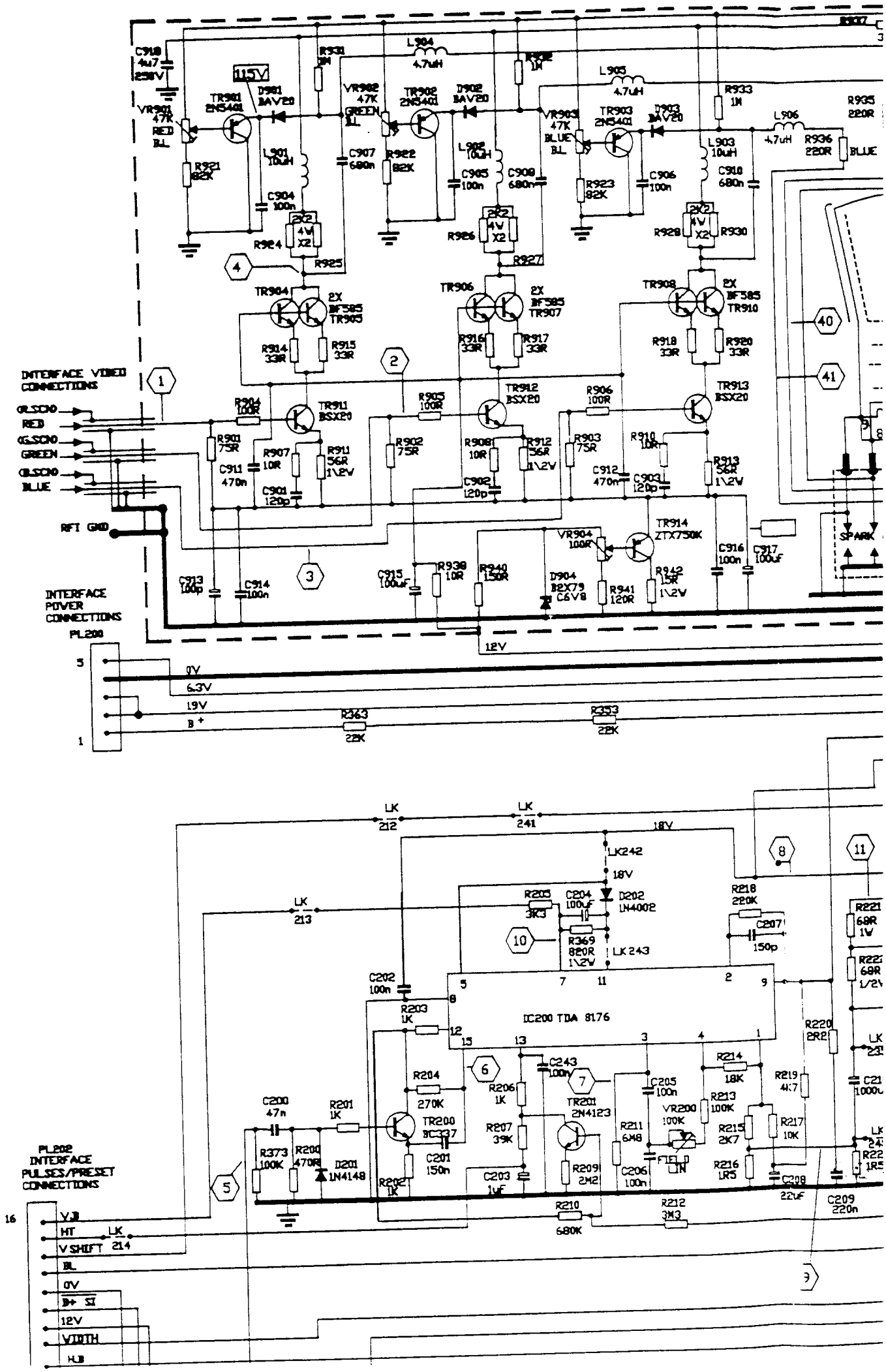

IC200 TDA 8176
PANORAMIC SYNC SUB PCB
LK241
LK242
LK243
LK200
LK218
LK215
LK227
LK235
LK245
LK236
LK239
LK249
18V
12V
6.3V
5V
0V
TR201 2N4123
TR202 ZTX650
TR203 ZTX750
TR204 2N4123
TR205
TR206
TR207 BC337
TR225 BC337
TR103 2N4123
TR104 BC337
TR105 BC337
TR106 2N7000
TR107
TR109 BC307
TR102 BC337
IC101a
IC101b
IC101c
IC101d
IC102a
IC102b
IC102c
IC102d
IC103
IC104 ZN435
D202 1N4002
D204
D101
D102 5141RD
D103 1N4148
D104 5V1 BZX79
D105 1N4148
D203 C7V5 BZX79
2x IN4148
VR200 100K FIELD LIN
VR201 10K SET E-W
B+ INHIBIT
Vout
UP
DOWN
Vref in
2.5Vref
CLK
PHASE
Osc ref
SET E-W

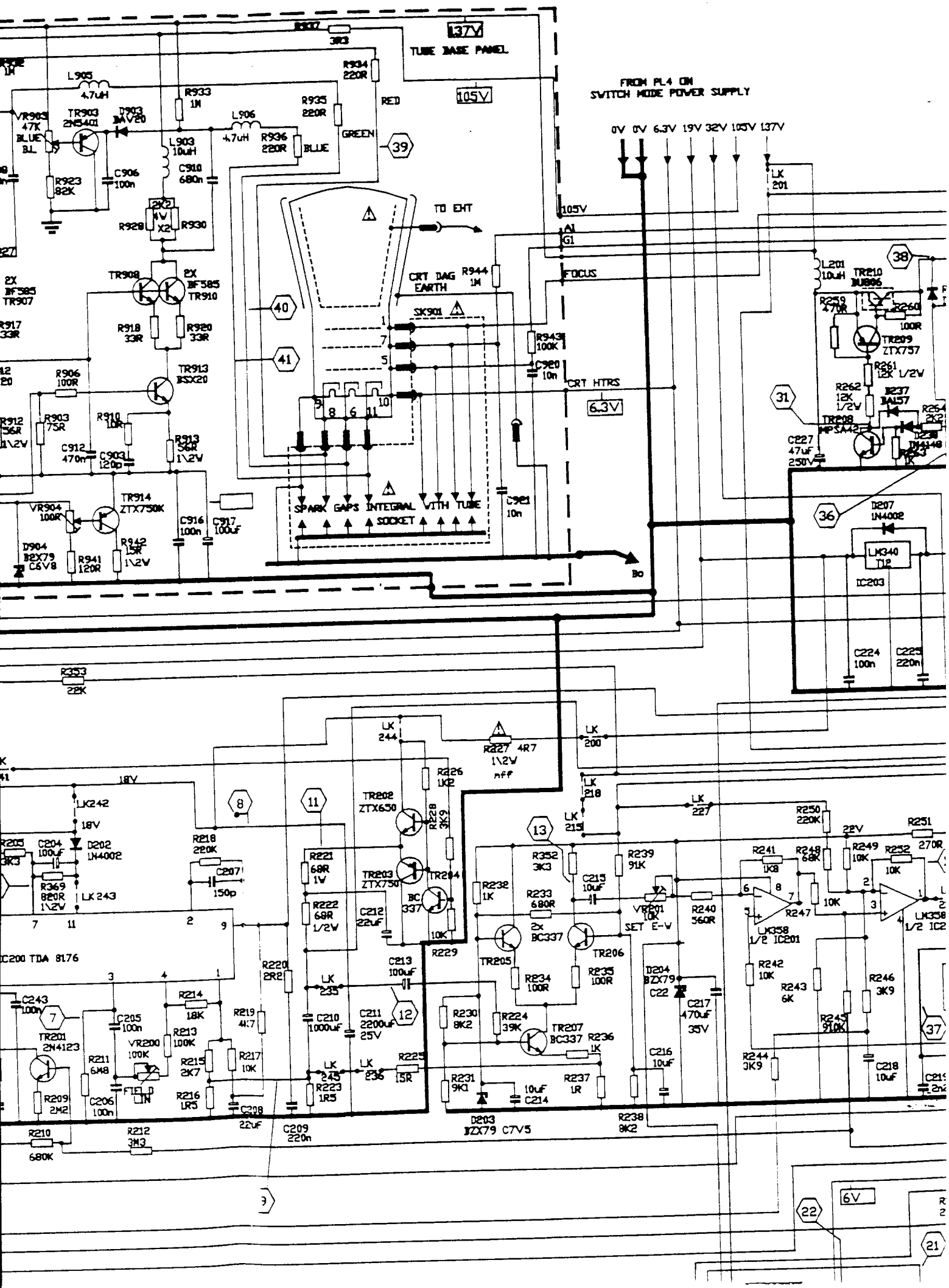

TDA 8595 IC 206
IC202 TDA 4950
LM358 1/2 IC201
1/2 IC207
E-W LOADING COIL
SET E-W
BRIGHTNESS
B+ INHIBIT
TR225 BC337
TR222 BC337
TR215 BC337
TR102 BC337
TR206
TR212
TR216
ZTX652
6V
12V
22V
32V
6.3V
5V
31.5V
L200
L203 10uH
L207 100uH



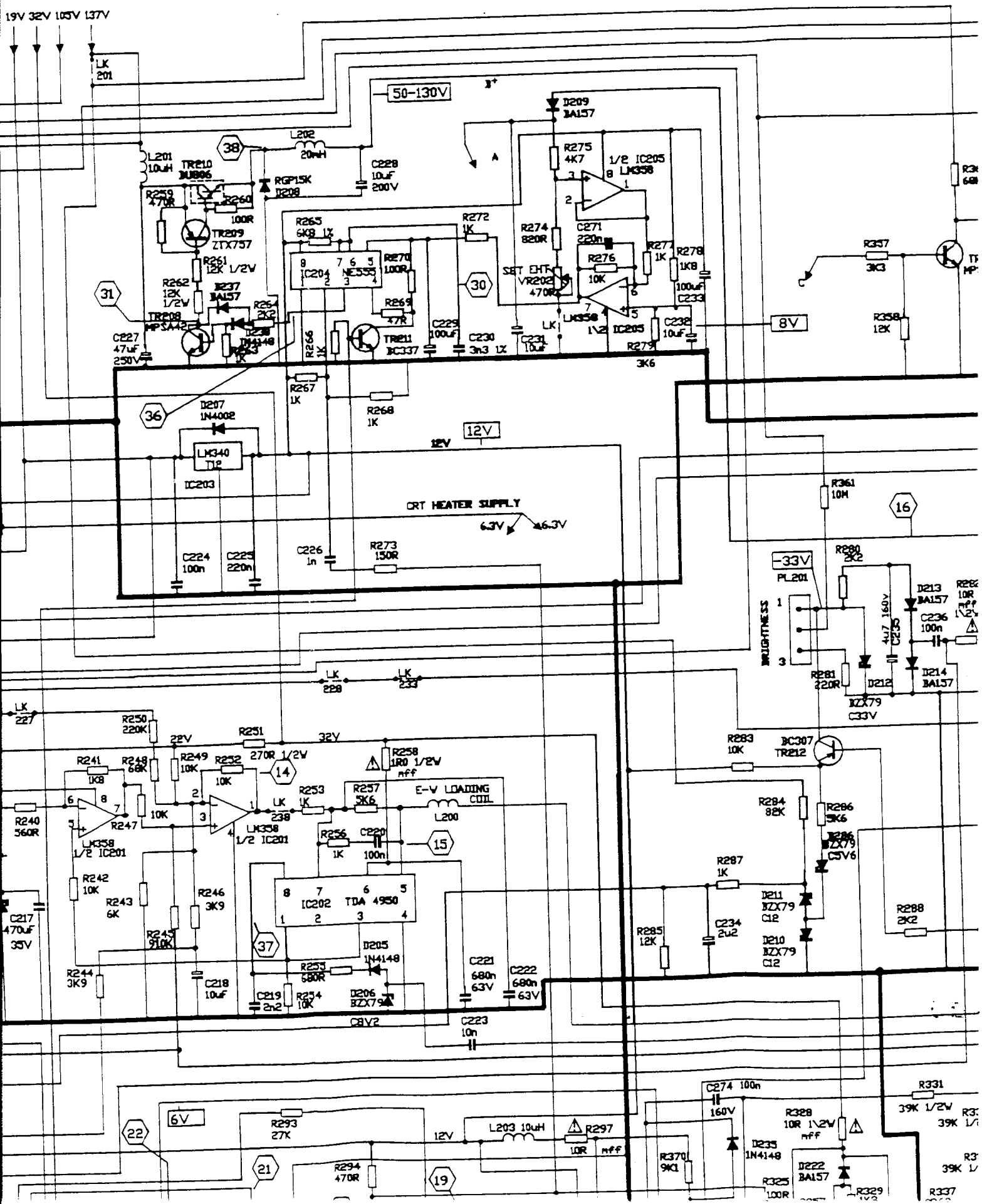
COMPONENTS MARKED ⚠ ARE SAFETY APPROVED COMPONENTS AND MUST ONLY BE REPLACED WITH COMPONENTS SUPPLIED OR APPROVED BY OUR SERVICE DEPARTMENT	SYMBOL	DENOTES
	LK	WIRE LINK
	mff	METAL FILM FUSIBLE RESISTOR
	⬡	WAVEFORM MEASUREMENT POINT
	▭	VOLTAGE MEASUREMENT POINT

DRIVE/DEFLECTION PCB CIRCUIT DIAGRAM (ALL 12" MODELS EXCEPT 12L71DNS3)

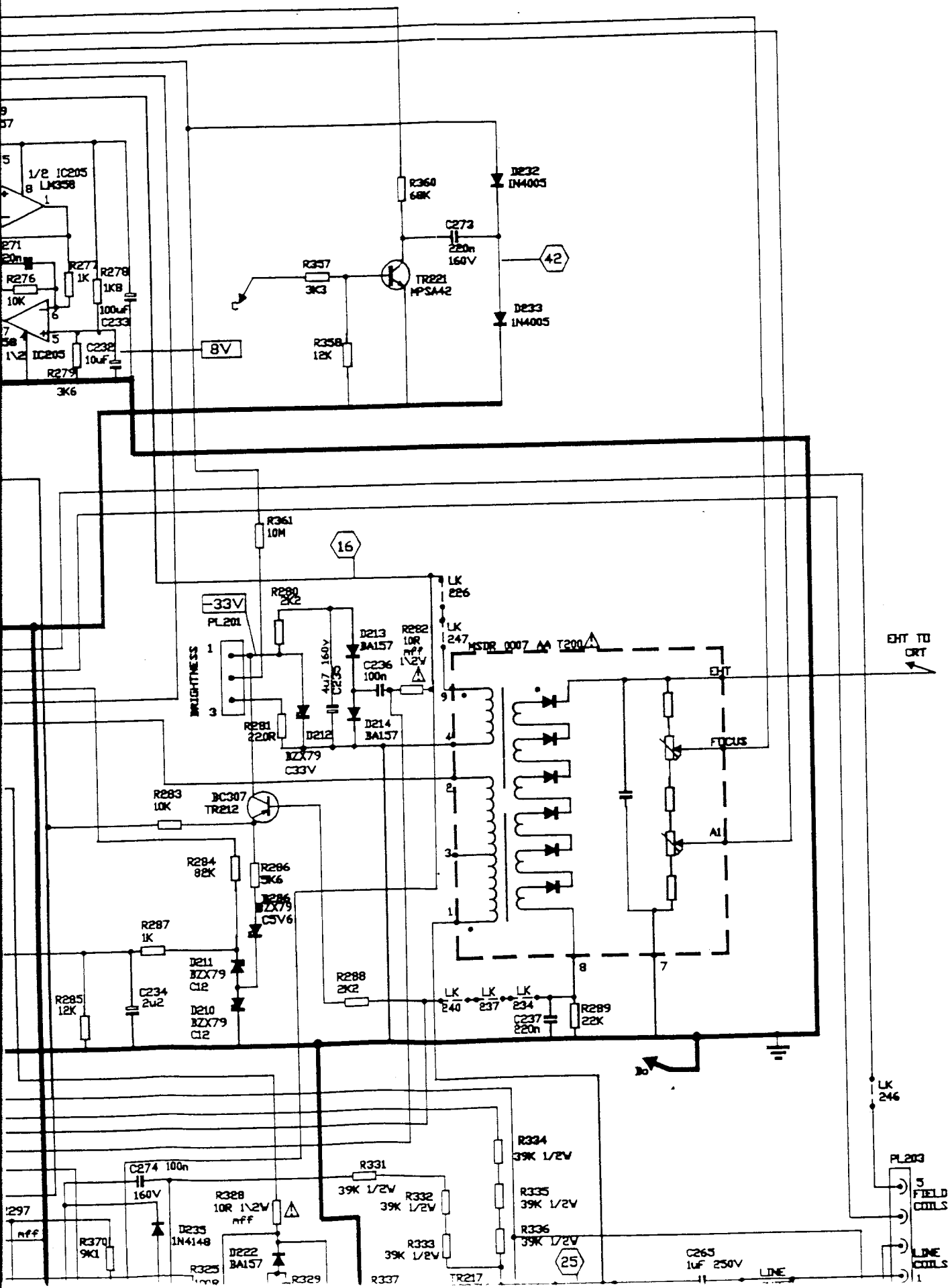

INTERFACE VIDEO CONNECTIONS
RFT GND
INTERFACE POWER CONNECTIONS
PL200
0V
6.3V
19V
B+
12V
PL202 INTERFACE PULSES/PRESET CONNECTIONS
VJB
HT
V SHIFT
BL
0V
B+ SI
12V
WIDTH
HJB
IC200 TDA 8176
TR901 2N5401
TR902 2N5401
TR903 2N5401
TR904 2X BF585 TR905
TR906 2X BF585 TR907
TR908 2X BF585 TR910
TR911 BSX20
TR912 BSX20
TR913 BSX20
TR914 ZTX750K
TR200 BC337
TR201 2N4123
D901 BAV20
D902 BAV20
D903 BAV20
D904 BZX79 C6V8
D201 1N4148
D202 1N4002
L904 4.7uH
L905 4.7uH
L906 4.7uH
L901 10uH
L902 10uH
L903 10uH
SPARK

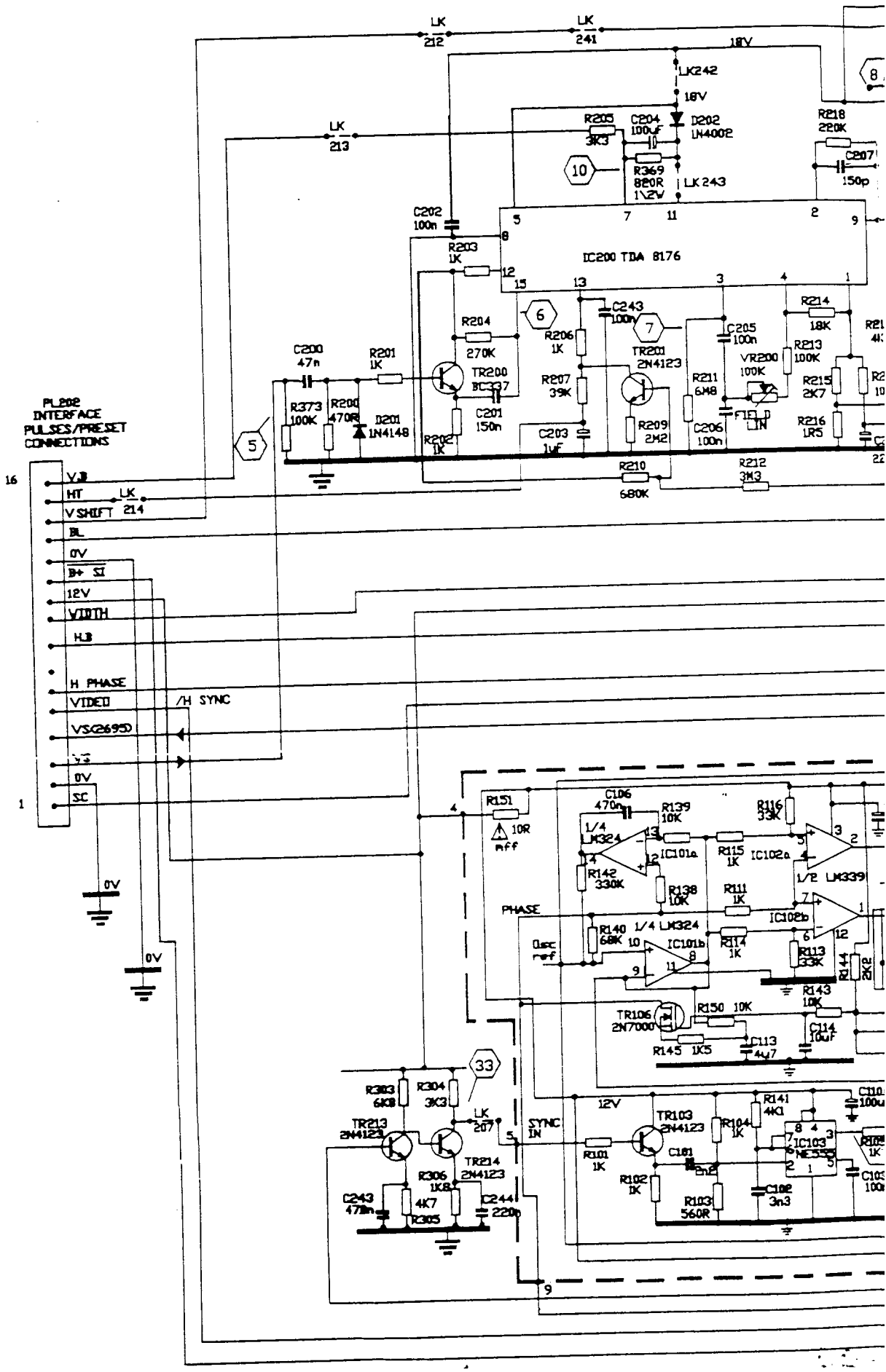

137V
TUBE BASE PANEL
105V
FROM PL4 ON
SWITCH MODE POWER SUPPLY
0V 0V 6.3V 19V 32V 105V 137V
TO EHT
CRT DAG EARTH
SK901
CRT HTRS
6.3V
SPARK GAPS INTEGRAL WITH TUBE SOCKET
FOCUS
G1
A1
L905 4.7uH
L903 10uH
L906 4.7uH
TR903 2N5401
D903 BAV20
TR908
TR910 2X BF585
TR907 2X BF585
TR913 BSX20
TR914 ZTX750K
TR909 ZTX757
TR210 BU806
TR208 MPSA42
D904 BZX79 C6V8
D207 1N4002
IC203 LM340 T12
IC200 TDA 8176
TR202 ZTX650
TR203 ZTX750
TR204 BC 337
TR205
TR206 2x BC337
TR201 2N4123
D202 1N4002
D203 BZX79 C7V5
D204 BZX79 C22
LM358 1/2 IC201
LM358 1/2 IC2
VR903 47K BLUE BL
VR904 100R
VR200 100K FIELD LIN
VR201 10K SET E-W
R933 1M
R934 220R
R935 220R
R936 220R
R923 82K
R929 2K2 4W X2
R930
R944 1M
R943 100K
R917 33R
R918 33R
R920 33R
R906 100R
R903 75R
R910 10R
R912 56R 1\2W
R913 56R 1\2W
R941 120R
R942 15R 1\2W
R353 22K
R369 820R 1\2W
R218 220K
R221 68R 1W
R222 68R 1/2W
R220 2R2
R214 18K
R213 100K
R215 2K7
R217 10K
R219 4K7
R211 6K8
R209 2M2
R216 1R5
R223 1R5
R225 15R
R210 680K
R212 3M3
R226 1K2
R228 3K9
R229 10K
R232 1K
R233 680R
R234 100R
R235 100R
R230 8K2
R224 39K
R236 1K
R231 9K1
R237 1R
R238 8K2
R352 3K3
R239 91K
R240 560R
R241 1K8
R248 68K
R249 10K
R252 10K
R250 220K
R251 270R
R247 10K
R242 10K
R243 6K
R246 3K9
R245 910K
R244 3K9
R259 470R
R260 100R
R261 12K 1/2W
R262 12K 1/2W
R264 2K2
C906 100n
C910 680n
C903 120p
C912 470n
C916 100n
C917 100uF
C901 10n
C920 10n
C227 47uF 250V
C224 100n
C225 220n
C204 100uF
C207 150p
C212 22uF
C213 100uF
C210 1000uF
C211 2200uF 25V
C205 100n
C206 100n
C208 22uF
C209 220n
C243 100n
C215 10uF
C216 10uF
C217 470uF 35V
C218 10uF
C214 10uF
R227 4R7 1\2W nff
LK 244
LK 200
LK 218
LK 215
LK 227
LK 235
LK 245
LK 236
LK 201
LK242
LK 243
18V
22V
6V
105V
BC
RED
GREEN
BLUE
2X
nff

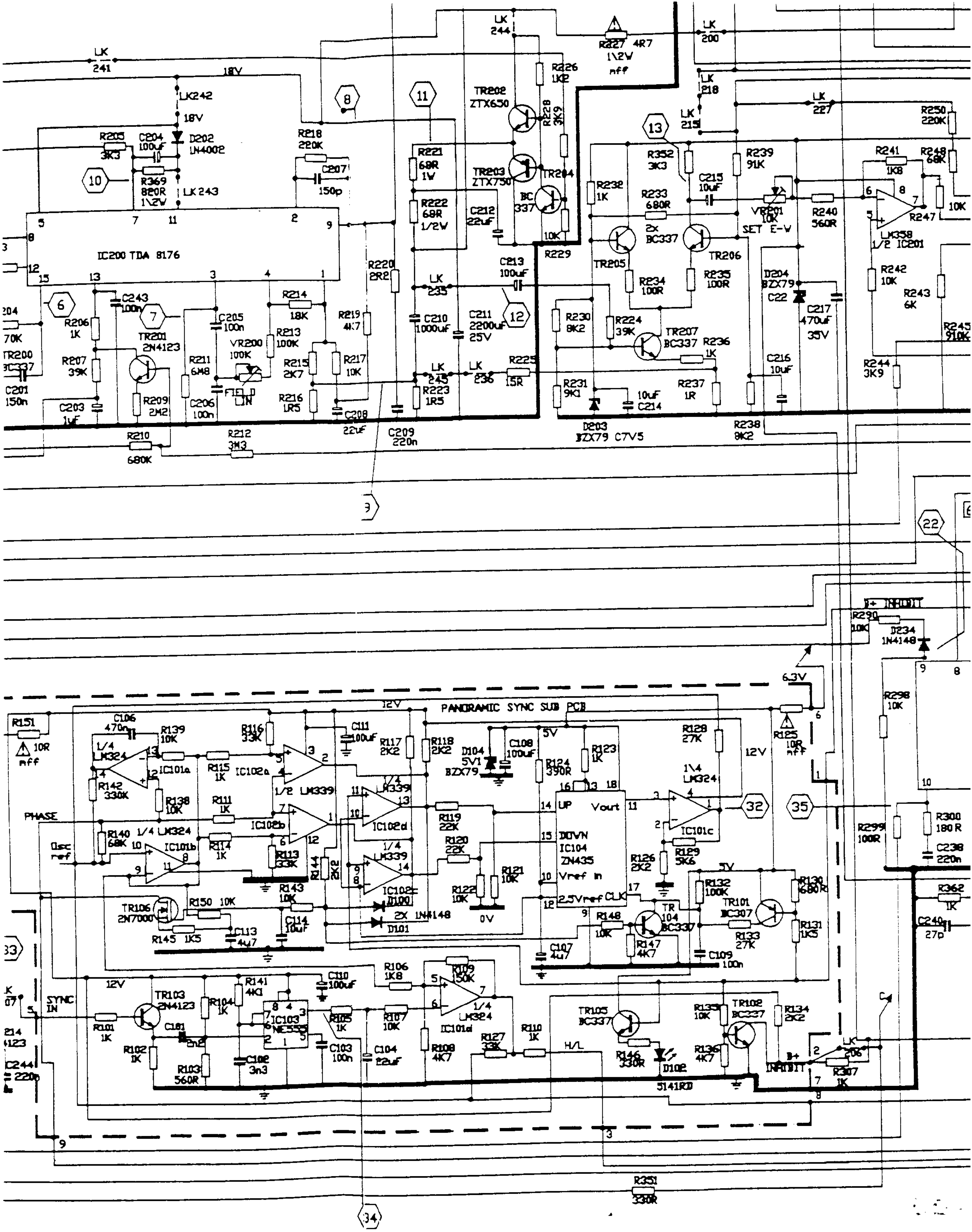
For Service Manuals
MAURITRON SERVICES
8 Cherry Tree Road, Chinnor
Oxfordshire, OX9 4QY.
Tel (01844) 351694
Fax (01844) 352554
email:- mauritron@dial.pipex.com



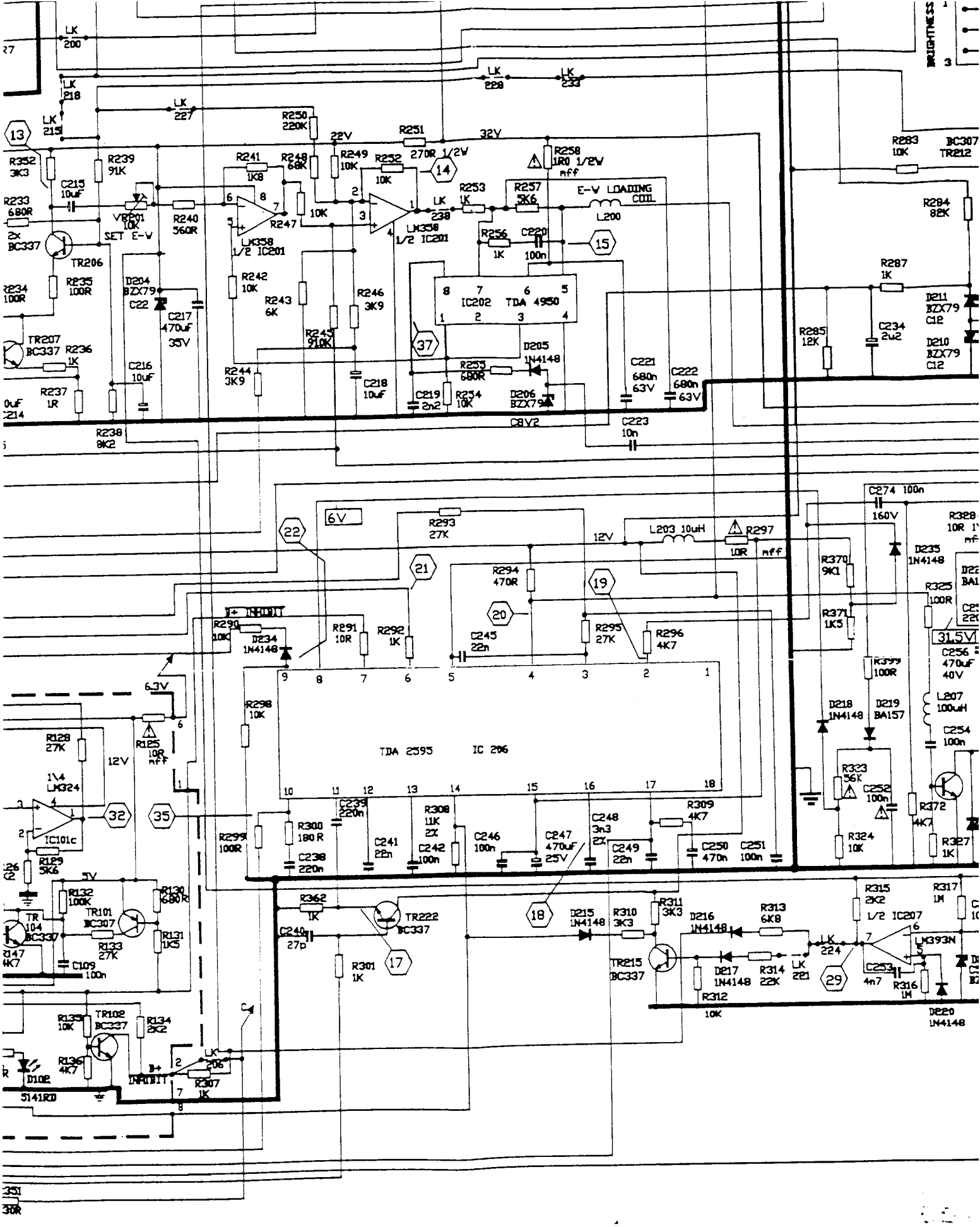
SERIES 7 MK2: DRIVE/DEFLECTION PCB

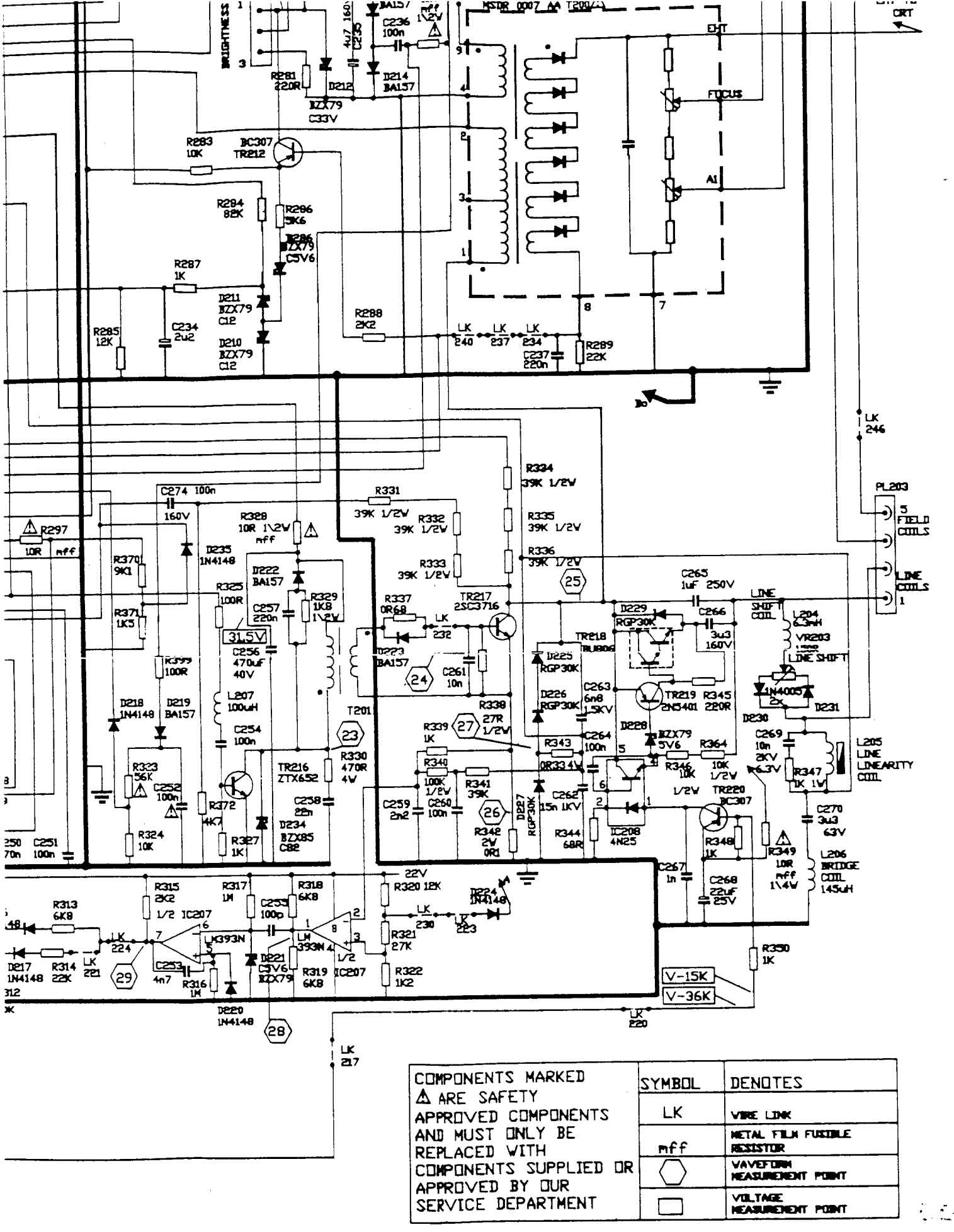



LK 212
LK 241
18V
LK242
LK 213
R205 3K3
C204 100uF
D202 1N4002
R218 220K
C207 150p
R369 820R 1\2W
LK 243
C202 100n
R203 1K
IC200 TDA 8176
R204 270K
TR200 BC337
C200 47n
R201 1K
R373 100K
R200 470R
D201 1N4148
C201 150n
R202 1K
R206 1K
C243 100n
TR201 2N4123
R207 39K
C203 1uF
R209 2M2
C205 100n
R211 6M8
VR200 100K
C206 100n
R213 100K
R214 18K
R215 2K7
R216 1R5
R210 680K
R212 3M3
PL202 INTERFACE PULSES/PRESET CONNECTIONS
V.B
HT
V SHIFT
BL
0V
B+ SI
12V
VIDTH
H.B
H PHASE
VIDEO
VSG2695D
0V
SC
/H SYNC
LK 214
R151 10R
C106 470n
R139 10K
R116 33K
1/4 LM324
IC101a
R142 330K
R138 10K
R115 1K
IC102a
1/2 LM339
R111 1K
PHASE
IC102b
R140 68K
1/4 LM324
IC101b
Osc ref
R114 1K
R113 33K
R143 10K
TR106 2N7000
R150 10K
C114 10uF
R145 1K5
C113 4u7
R303 6K8
R304 3K3
TR213 2N4123
TR214 2N4123
R306 1K8
C243 47n
4K7 R305
C244 220p
SYNC IN
12V
TR103 2N4123
R141 4K1
R104 1K
IC103 NE555
R101 1K
C101 2n2
R102 1K
C102 3n3
R103 560R
C103 100n



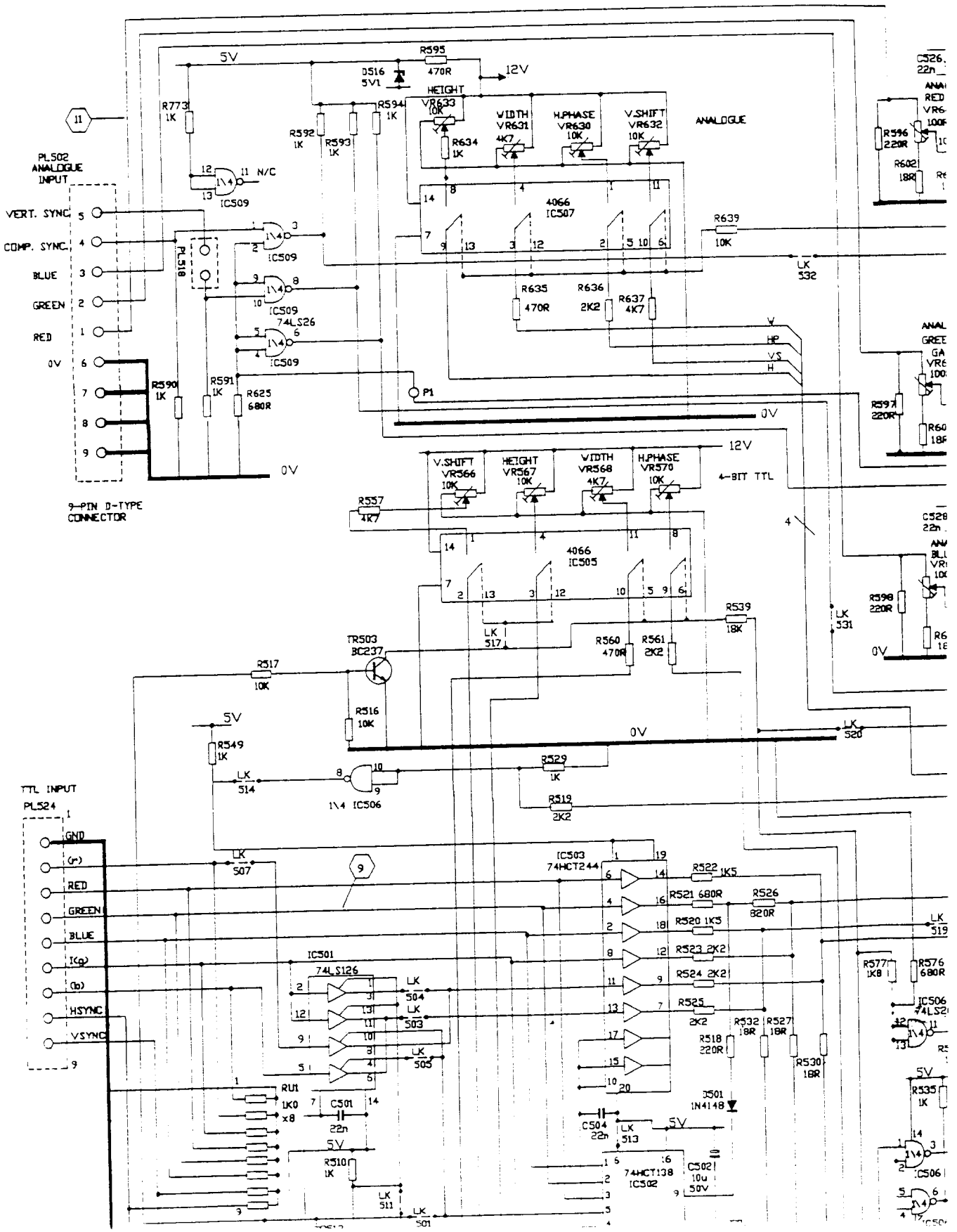
LK 241
18V
LK242
18V
D202 1N4002
R205 3K3
C204 100uF
R369 820R 1\2W
LK 243
10
8
11
LK 244
R226 1K2
R228 3K9
TR202 ZTX650
TR203 ZTX750
TR204
BC 337
10K
R229
R227 4R7 1\2W nff
LK 200
LK 218
LK 215
LK 227
13
R218 220K
C207 150p
R221 68R 1W
R222 68R 1/2W
C212 22uF
IC200 TDA 8176
5 7 11 2 9 8 12 15 13 3 4 1
R220 2R2
LK 235
C213 100uF
12
C210 1000uF
C211 2200uF 25V
LK 245
LK 236
R225 15R
R223 1R5
C209 220n
6
7
C243 100n
R206 1K
R207 39K
TR201 2N4123
R209 2M2
C203 1uF
TR200 BC337
C201 150n
R211 6M8
C205 100n
C206 100n
VR200 100K
FIELD LIN
R214 18K
R213 100K
R215 2K7
R216 1R5
R217 10K
R219 4K7
C208 22uF
R210 680K
R212 3M3
9
R352 3K3
R232 1K
R233 680R
2x BC337
TR205
TR206
R234 100R
R235 100R
R230 8K2
R224 39K
TR207 BC337
R236 1K
R231 9K1
R237 1R
D203 BZX79 C7V5
C214 10uF
R239 91K
C215 10uF
VR201 10K
SET E-W
R240 560R
D204 BZX79 C22
C217 470uF 35V
C216 10uF
R238 8K2
R241 1K8
R248 68K
R250 220K
R247
10K
LM358 1/2 IC201
R242 10K
R243 6K
R244 3K9
R245 910K
22
B+ INHIBIT
R290 10K
D234 1N4148
6.3V
9 8 10
R298 10K
PANORAMIC SYNC SUB PCB
12V
R151 10R nff
C106 470n
R139 10K
1/4 LM324
IC101a
R142 330K
R138 10K
R116 33K
R115 1K
IC102a
1/2 LM339
C111 100uF
R117 2K2
R118 2K2
PHASE
R111 1K
IC102b
R140 68K
1/4 LM324
IC101b
Osc ref
R114 1K
R113 33K
R144 2K2
1/4 LM339
IC102d
IC102c
R119 22K
R120 22K
R122 10K
R121 10K
0V
D104 5V1 BZX79
C108 100uF
5V
R124 390R
R123 1K
IC104 ZN435
UP Vout DOWN Vref in 2.5Vref CLK
16 13 18 14 15 10 12 11 17 9
R128 27K
1\4 LM324
IC101c
R126 2K2
R129 5K6
32
35
R125 10R nff
R299 100R
R300 180R
C238 220n
R362 1K
C240 27p
TR106 2N7000
R150 10K
R143 10K
R145 1K5
C113 4u7
C114 10uF
D100
D101
2X 1N4148
C107 4u7
R148 10K
TR104 BC337
R147 4K7
R132 100K
TR101 BC307
R133 27K
R130 680R
R131 1K5
C109 100n
33
SYNC IN
TR103 2N4123
R101 1K
R102 1K
C101 2n2
R103 560R
R104 1K
R141 4K1
IC103 NE555
C102 3n3
C110 100uF
R105 1K
C103 100n
R107 10K
C104 22uF
R106 1K8
R109 150K
1/4 LM324
IC101d
R108 4K7
R127 33K
R110 1K
H/L
TR105 BC337
R146 330R
D102 5141RD
R135 10K
TR102 BC337
R134 2K2
R136 4K7
B+ INHIBIT
LK 206
R307 1K
C244 220n
R214 2N4123
LK 207
34
R351 330R

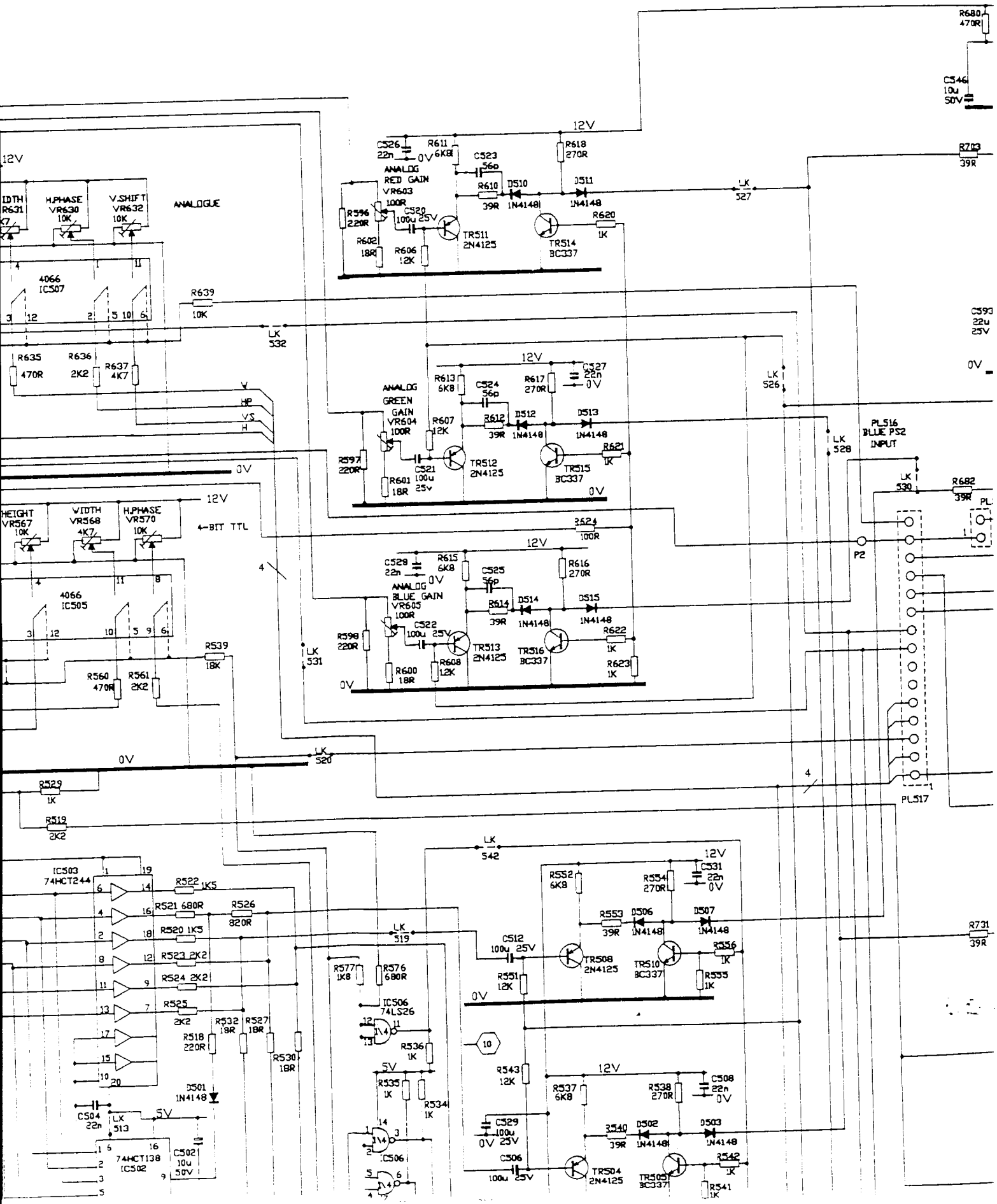

LK 200
LK 218
LK 215
LK 227
LK 228
LK 233
R250 220K
R251
22V
32V
R252 270R 1/2W
R258 1R0 1/2W mff
R253 1K
R257 5K6
E-W LOADING COIL
L200
R256 1K
C220 100n
LK 238
LM358 1/2 IC201
R241 1K8
R248 68K
R249 10K
R247 10K
R240 560R
VR201 10K SET E-W
R239 91K
R352 3K3
C215 10uF
R233 680R
2x BC337
TR206
R235 100R
D204 BZX79 C22
C217 470uF 35V
TR207 BC337
R236 1K
R237 1R
C216 10uF
R238 8K2
R242 10K
R243 6K
R245 910K
R246 3K9
R244 3K9
C218 10uF
IC202 TDA 4950
D205 1N4148
R255 680R
C219 2n2
R254 10K
D206 BZX79
C8V2
C221 680n 63V
C222 680n 63V
C223 10n
R283 10K
BC307 TR212
R284 82K
R287 1K
R285 12K
C234 2u2
D211 BZX79 C12
D210 BZX79 C12
6V
R293 27K
12V
L203 10uH
R297 10R mff
R294 470R
R290 10K
D234 1N4148
R291 10R
R292 1K
C245 22n
R295 27K
R296 4K7
TDA 2595 IC 206
R298 10K
R299 100R
R300 180R
C238 220n
C239 220n
C241 22n
R308 11K 2%
C242 100n
C246 100n
C247 470uF 25V
C248 3n3 2%
C249 22n
R309 4K7
C250 470n
C251 100n
C274 100n 160V
R328 10R
D235 1N4148
R370 9K1
R325 100R
R371 1K5
31.5V
C256 470uF 40V
R329 100R
L207 100uH
D218 1N4148
D219 BA157
C254 100n
R323 56K
C252 100n
R372 4K7
R324 10K
R327 1K
6.3V
R125 10R mff
R128 27K
12V
1\4 LM324
IC101c
R129 5K6
5V
R132 100K
R130 680R
TR 104 BC337
TR101 BC307
R131 1K5
R133 27K
C109 100n
R135 10K
TR102 BC337
R134 2K2
R136 4K7
D102 5141RD
B+ INHIBIT
LK 206
R307 1K
R362 1K
C240 27p
TR222 BC337
R301 1K
D215 1N4148
R310 3K3
R311 3K3
TR215 BC337
D216 1N4148
R313 6K8
D217 1N4148
R314 22K
LK 221
R312 10K
LK 224
R315 2K2
L/2 IC207
LM393N
C253 4n7
R316 1M
R317 1M
D220 1N4148
BRIGHTNESS
1
2
3

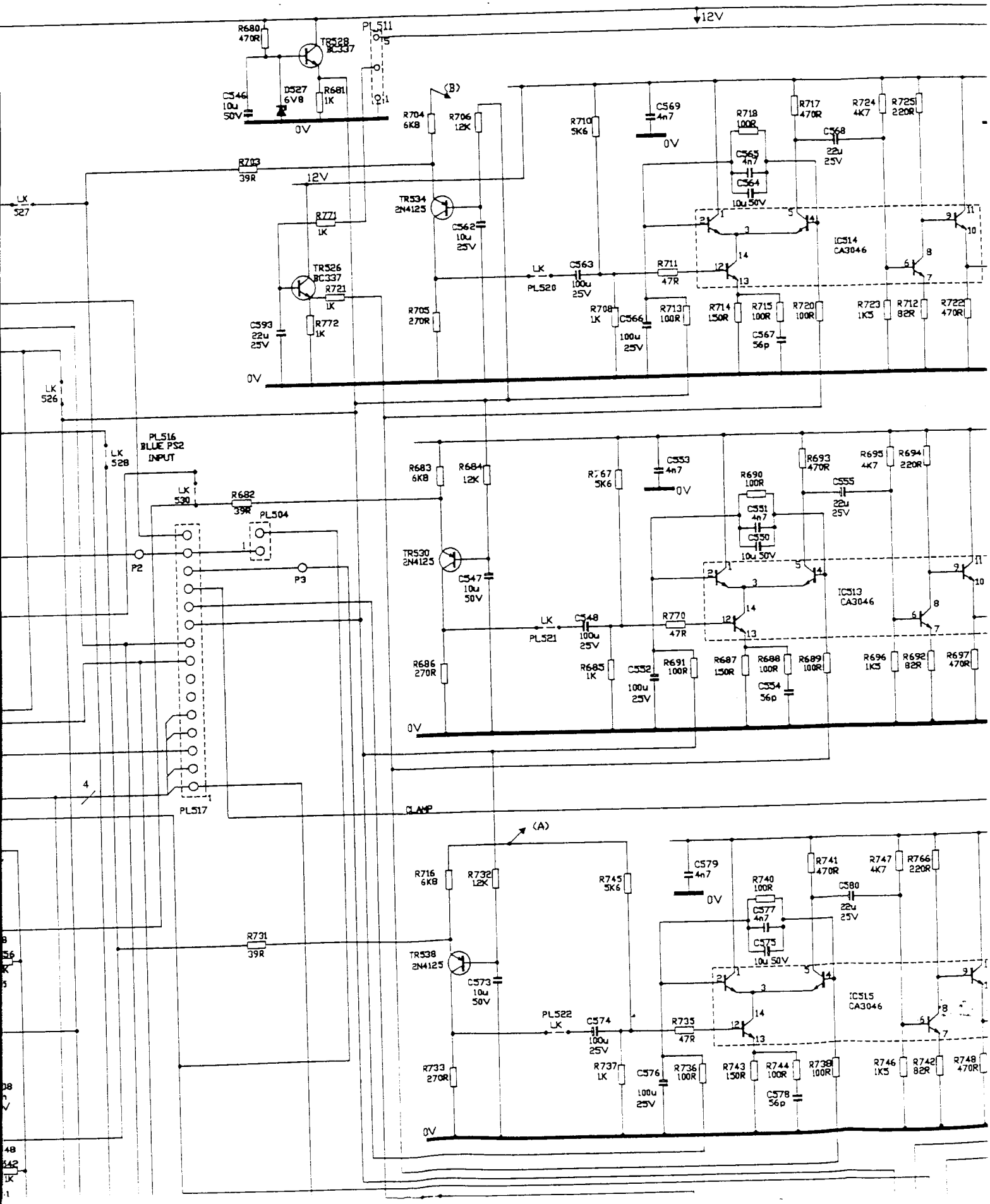


COMPONENTS MARKED ⚠ ARE SAFETY APPROVED COMPONENTS AND MUST ONLY BE REPLACED WITH COMPONENTS SUPPLIED OR APPROVED BY OUR SERVICE DEPARTMENT	SYMBOL	DENOTES
	LK	WIRE LINK
	mff	METAL FILM FUSIBLE RESISTOR
	⬡	WAVEFORM MEASUREMENT POINT
	▭	VOLTAGE MEASUREMENT POINT

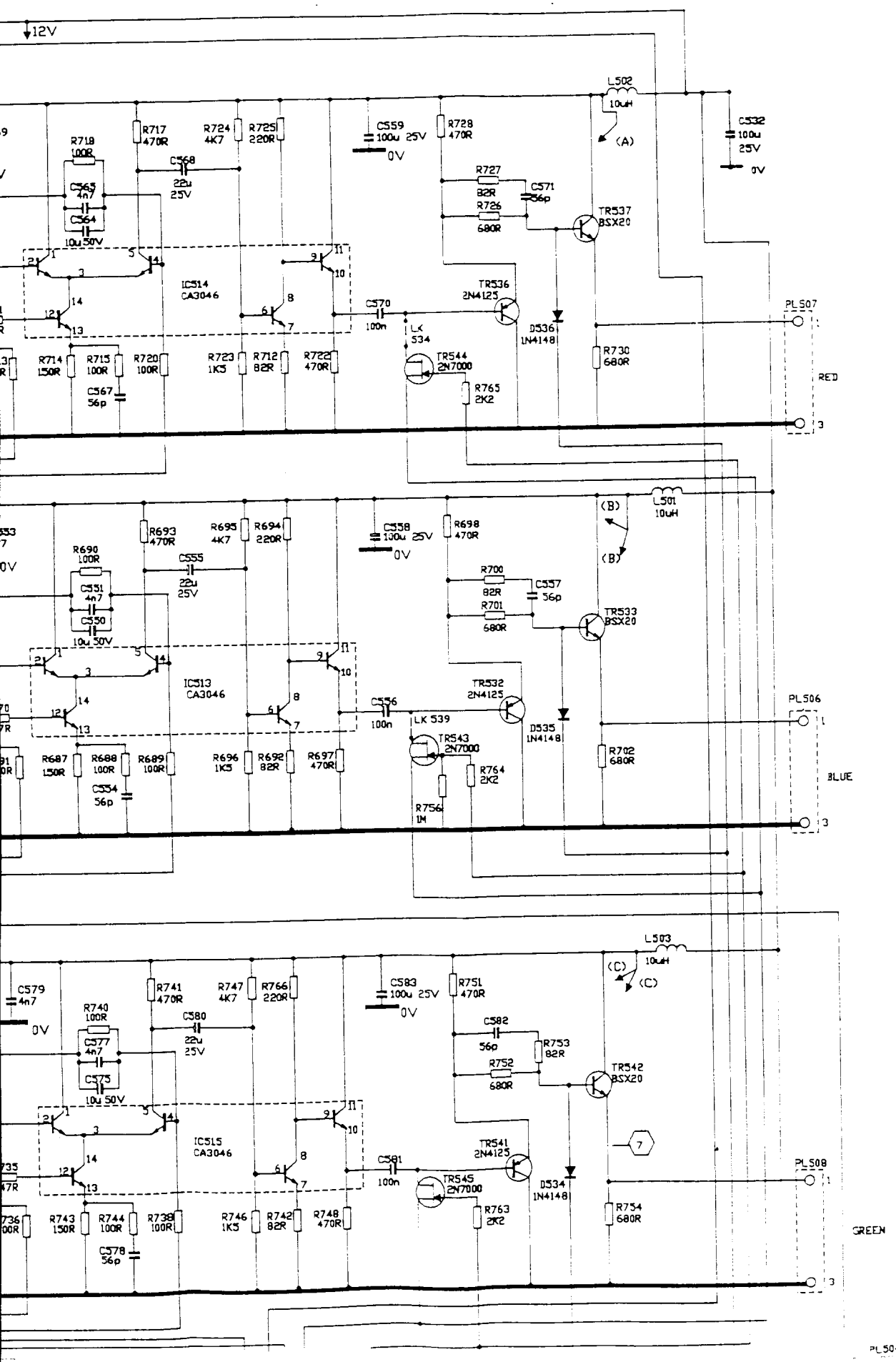
DRIVE/DEFLECTION PCB CIRCUIT DIAGRAM (ALL 20" & 14" MODELS)

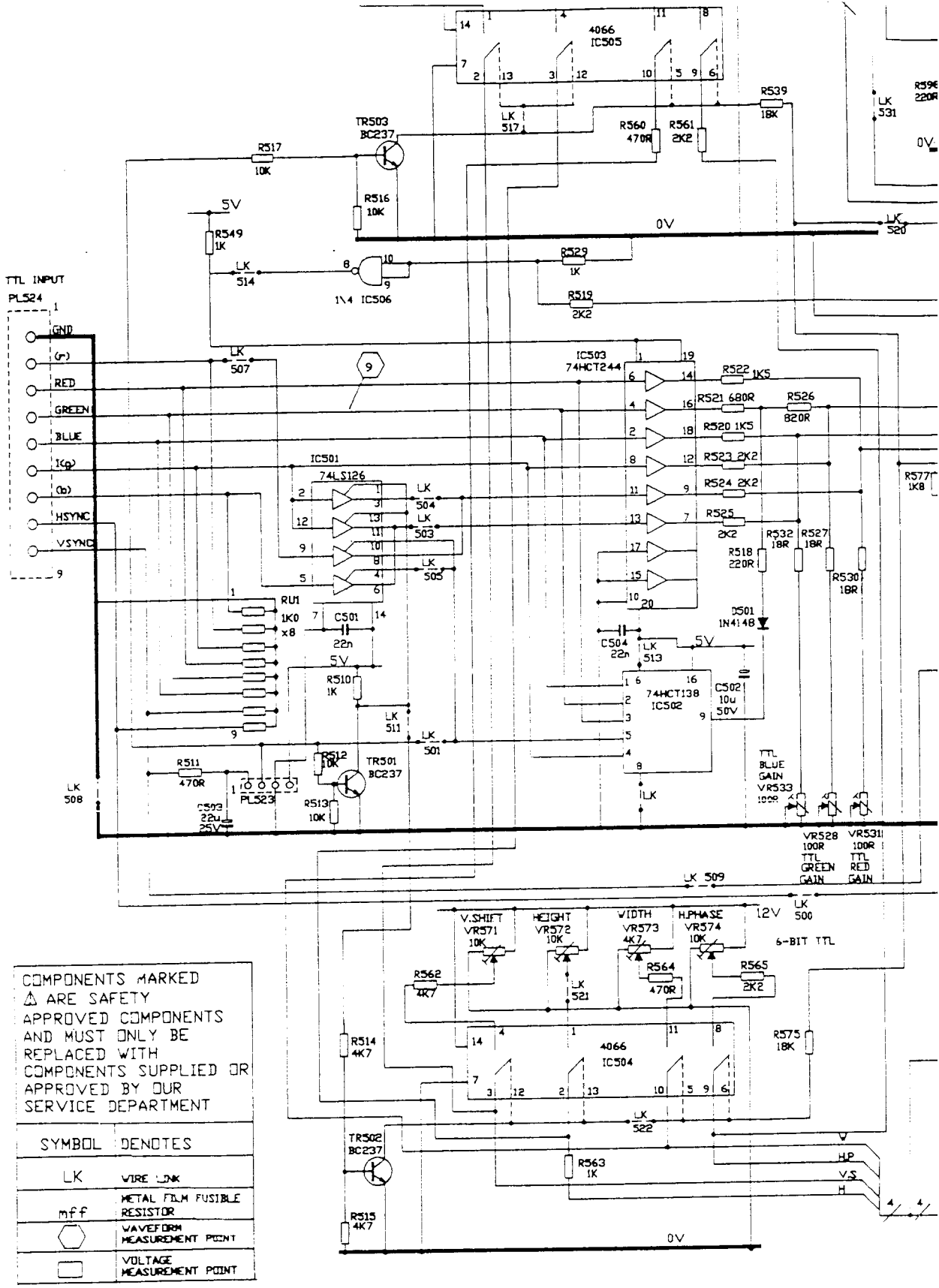

PL502
ANALOGUE
INPUT
VERT. SYNC
COMP. SYNC.
BLUE
GREEN
RED
0V
9-PIN D-TYPE
CONNECTOR
PL518
IC509
74LS26
R590 1K
R591 1K
R625 680R
R592 1K
R593 1K
R594 1K
R773 1K
R595 470R
D516 5V1
5V
12V
HEIGHT VR633 10K
WIDTH VR631 4K7
H.PHASE VR630 10K
V.SHIFT VR632 10K
R634 1K
ANALOGUE
4066 IC507
R635 470R
R636 2K2
R637 4K7
R639 10K
LK 532
P1
V
HP
VS
H
0V
4-BIT TTL
V.SHIFT VR566 10K
HEIGHT VR567 10K
WIDTH VR568 4K7
H.PHASE VR570 10K
R557 4K7
4066 IC505
R539 18K
LK 517
LK 531
TR503 BC237
R560 470R
R561 2K2
R517 10K
R516 10K
R549 1K
LK 514
LK 520
IC506
R529 1K
R519 2K2
TTL INPUT
PL524
GND
(r)
RED
GREEN
BLUE
I(g)
(b)
HSYNC
VSYNC
LK 507
IC503 74HCT244
R522 1K5
R521 680R
R526 820R
R520 1K5
R523 2K2
R524 2K2
R525 2K2
R518 220R
R532 18R
R527 18R
R530 18R
LK 519
IC501 74LS126
LK 504
LK 503
LK 505
RU1 1K0 x8
C501 22n
R510 1K
LK 511
LK 501
D501 1N4148
C504 22n
LK 513
74HCT138 IC502
C502 10u 50V
R577 1K8
R576 680R
IC506 74LS2
R535 1K
IC506


12V
0V
ANALOGUE
IDTH R631
H.PHASE VR630 10K
V.SHIFT VR632 10K
4066 IC507
R639 10K
R635 470R
R636 2K2
R637 4K7
LK 532
C526 22n
R611 6K8
C523 56p
R618 270R
ANALOG RED GAIN VR603 100R
R596 220R
C520 100u 25V
R610 39R
D510 1N4148
D511 1N4148
LK 527
TR511 2N4125
TR514 BC337
R620 1K
R602 18R
R606 12K
R680 470R
C546 10u 50V
R703 39R
C527 22n
R613 6K8
C524 56p
R617 270R
ANALOG GREEN GAIN VR604 100R
R597 220R
R607 12K
C521 100u 25v
R601 18R
R612 39R
D512 1N4148
D513 1N4148
TR512 2N4125
TR515 BC337
R621 1K
LK 526
LK 528
PL516 BLUE PS2 INPUT
LK 530
R682 39R
P2
HP
VS
H
HEIGHT VR567 10K
WIDTH VR568 4K7
H.PHASE VR570 10K
4066 IC505
R539 18K
R560 470R
R561 2K2
LK 531
3624 100R
C528 22n
R615 6K8
C525 56p
R616 270R
ANALOG BLUE GAIN VR605 100R
R598 220R
C522 100u 25V
R614 39R
D514 1N4148
D515 1N4148
TR513 2N4125
TR516 BC337
R622 1K
R623 1K
R600 18R
R608 12K
LK 520
R529 1K
R519 2K2
PL517
IC503 74HCT244
R522 1K5
R521 680R
R526 820R
R520 1K5
R523 2K2
R524 2K2
R525 2K2
R532 18R
R527 18R
R518 220R
R530 18R
D501 1N4148
C504 22n
LK 513
IC502 74HCT138
C502 10u 50V
LK 519
R577 1K8
R576 680R
IC506 74LS26
R536 1K
R535 1K
R534 1K
LK 542
R552 6K8
C531 22n
R554 270R
R553 39R
D506 1N4148
D507 1N4148
C512 100u 25V
R551 12K
TR508 2N4125
TR510 BC337
R556 1K
R555 1K
R731 39R
R543 12K
R537 6K8
C529 100u 25V
C506 100u 25V
R538 270R
C508 22n
R540 39R
D502 1N4148
D503 1N4148
TR504 2N4125
TR505 BC337
R542 1K
R541 1K


12V
R680 470R
TR528 BC337
PL511
C546 10u 50V
D527 6V8
R681 1K
0V
(B)
R704 6K8
R706 12K
R703 39R
12V
LK 527
TR534 2N4125
C562 10u 25V
R771 1K
TR526 BC337
R721 1K
R772 1K
C593 22u 25V
R705 270R
0V
LK 526
C569 4n7
R710 5K6
0V
R718 100R
C565 4n7
C564 10u 50V
R717 470R
R724 4K7
R725 220R
C568 22u 25V
IC514 CA3046
LK PL520
C563 100u 25V
R711 47R
R708 1K
C566 100u 25V
R713 100R
R714 150R
R715 100R
C567 56p
R720 100R
R723 1K5
R712 82R
R722 470R
LK 528
PL516 BLUE PS2 INPUT
LK 530
R682 39R
PL504
P2
P3
R683 6K8
R684 12K
R731 39R
TR530 2N4125
C547 10u 50V
R686 270R
R685 1K
C552 100u 25V
R691 100R
R687 150R
R688 100R
C554 56p
R689 100R
R696 1K5
R692 82R
R697 470R
R767 5K6
C553 4n7
0V
R690 100R
C551 4n7
C550 10u 50V
R693 470R
R695 4K7
R694 220R
C555 22u 25V
IC513 CA3046
LK PL521
C548 100u 25V
R770 47R
0V
4
PL517
CLAMP
(A)
R716 6K8
R732 12K
R731 39R
TR538 2N4125
C573 10u 50V
R733 270R
R737 1K
C576 100u 25V
R736 100R
R743 150R
R744 100R
C578 56p
R738 100R
R746 1K5
R742 82R
R748 470R
R745 5K6
C579 4n7
0V
R740 100R
C577 4n7
C575 10u 50V
R741 470R
R747 4K7
R766 220R
C580 22u 25V
IC515 CA3046
PL522 LK
C574 100u 25V
R735 47R
0V

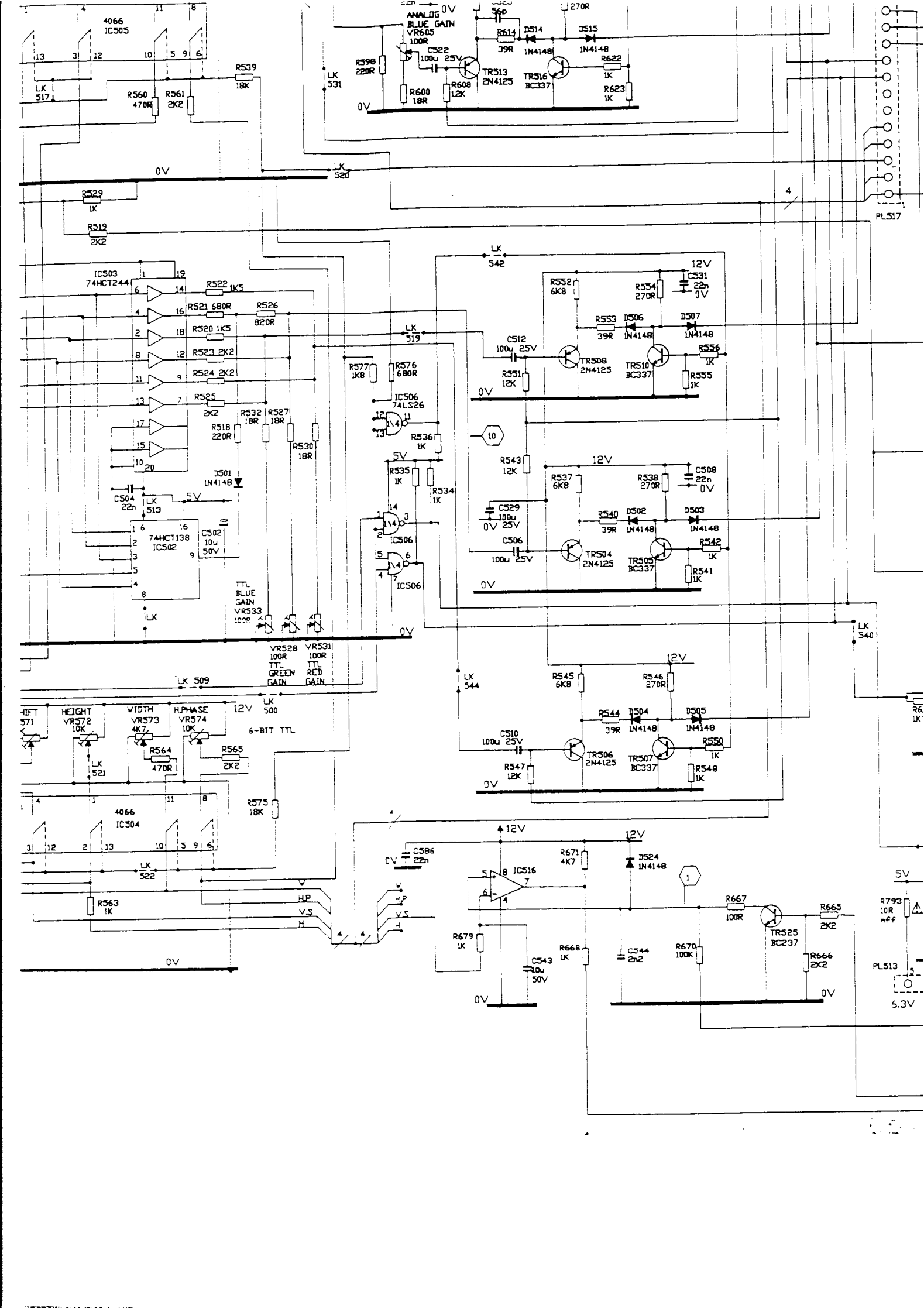
SERIES 7 MK2: INTERFACE PCB

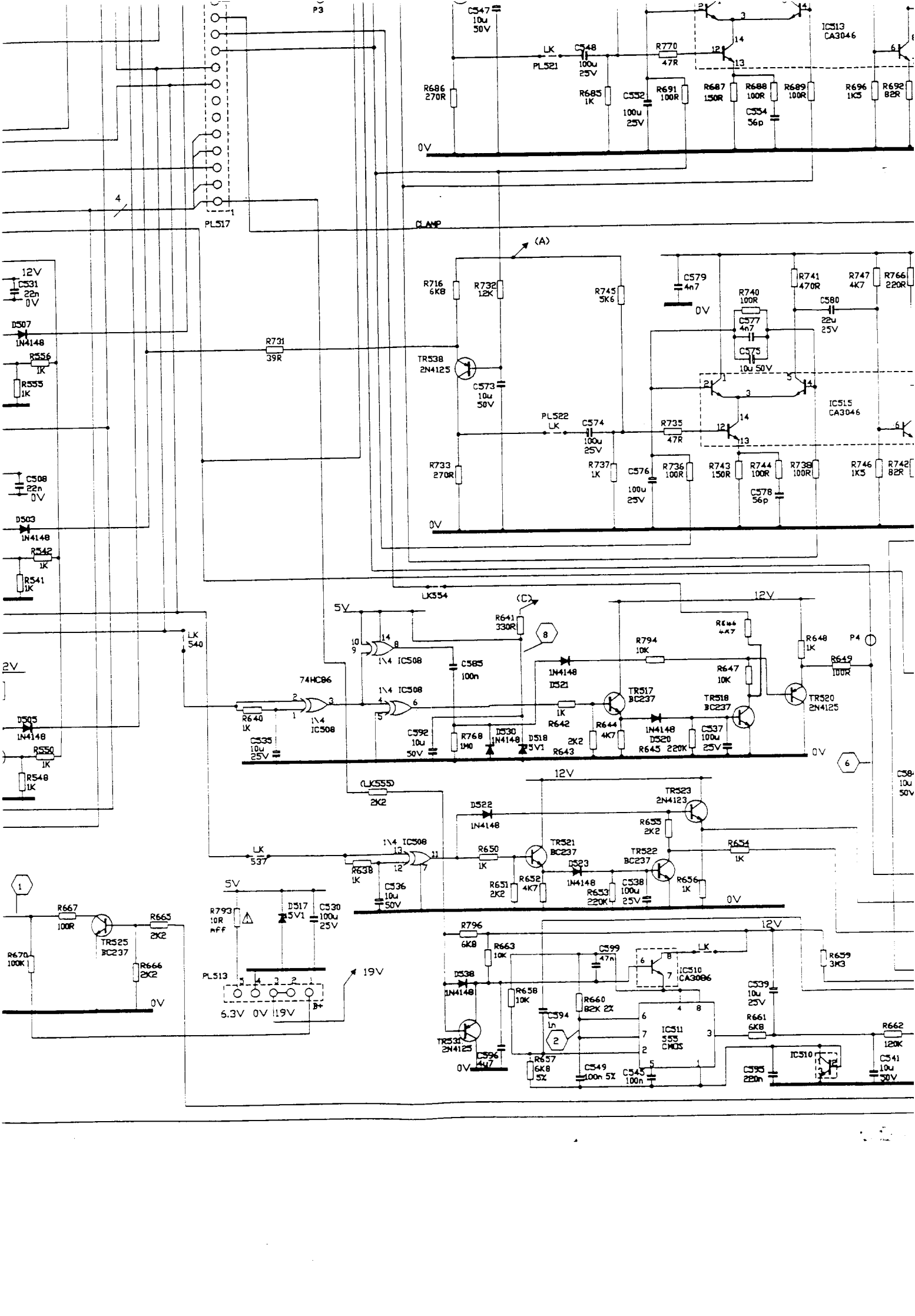


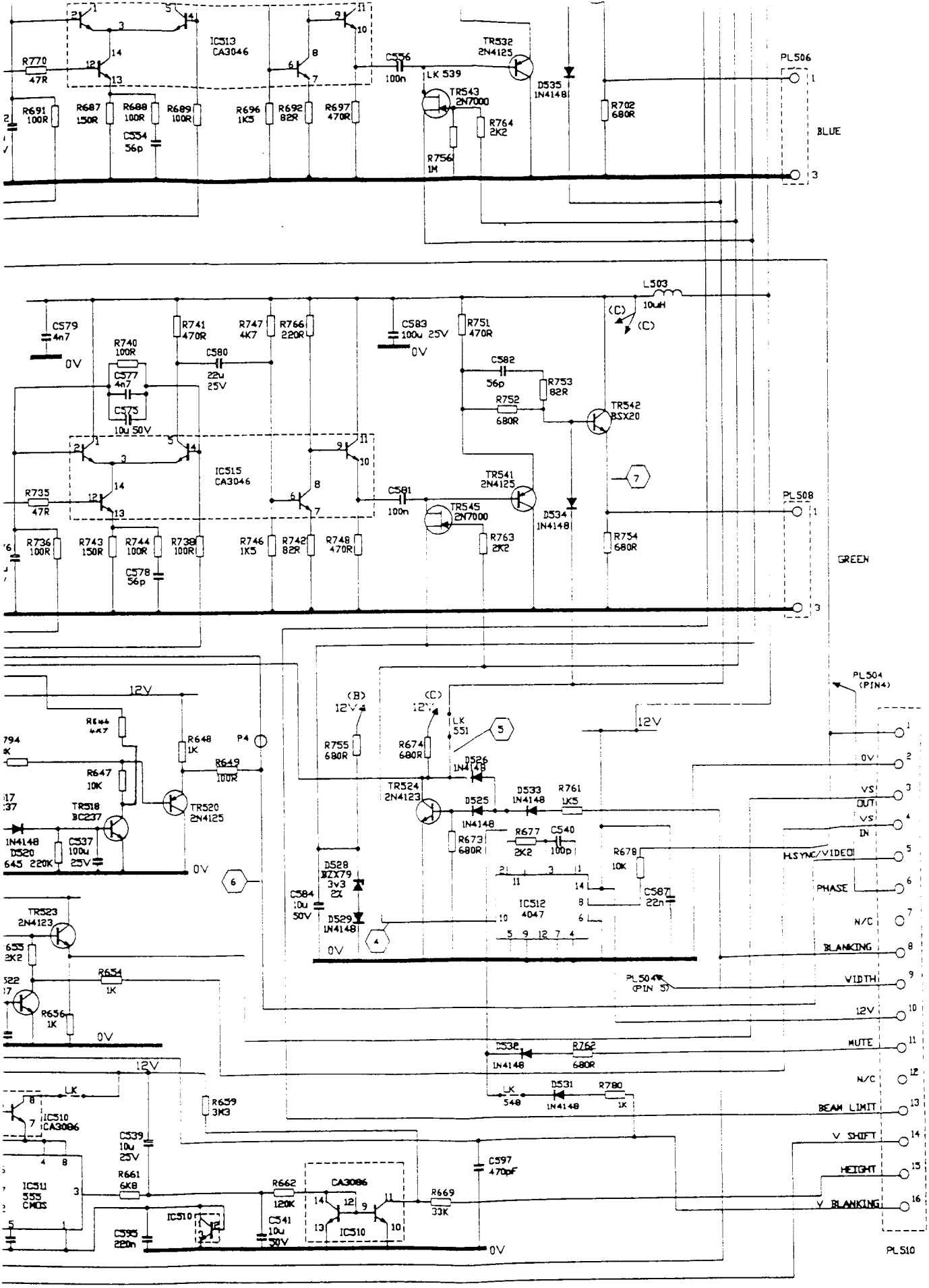


COMPONENTS MARKED ⚠ ARE SAFETY APPROVED COMPONENTS AND MUST ONLY BE REPLACED WITH COMPONENTS SUPPLIED OR APPROVED BY OUR SERVICE DEPARTMENT

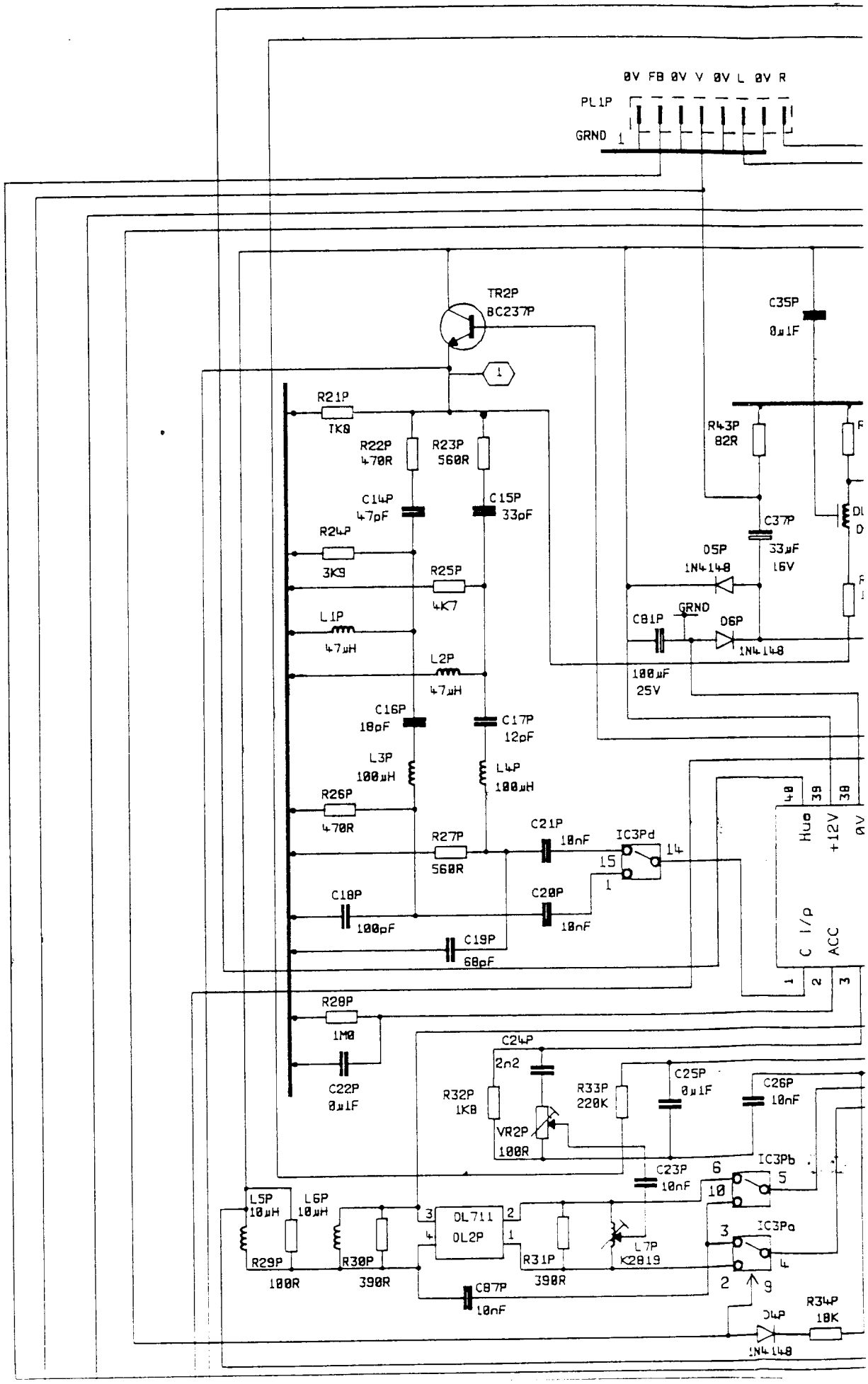
SYMBOL	DENOTES
LK	WIRE LINK
mff	METAL FILM FUSIBLE RESISTOR
⬡	WAVEFORM MEASUREMENT POINT
▭	VOLTAGE MEASUREMENT POINT

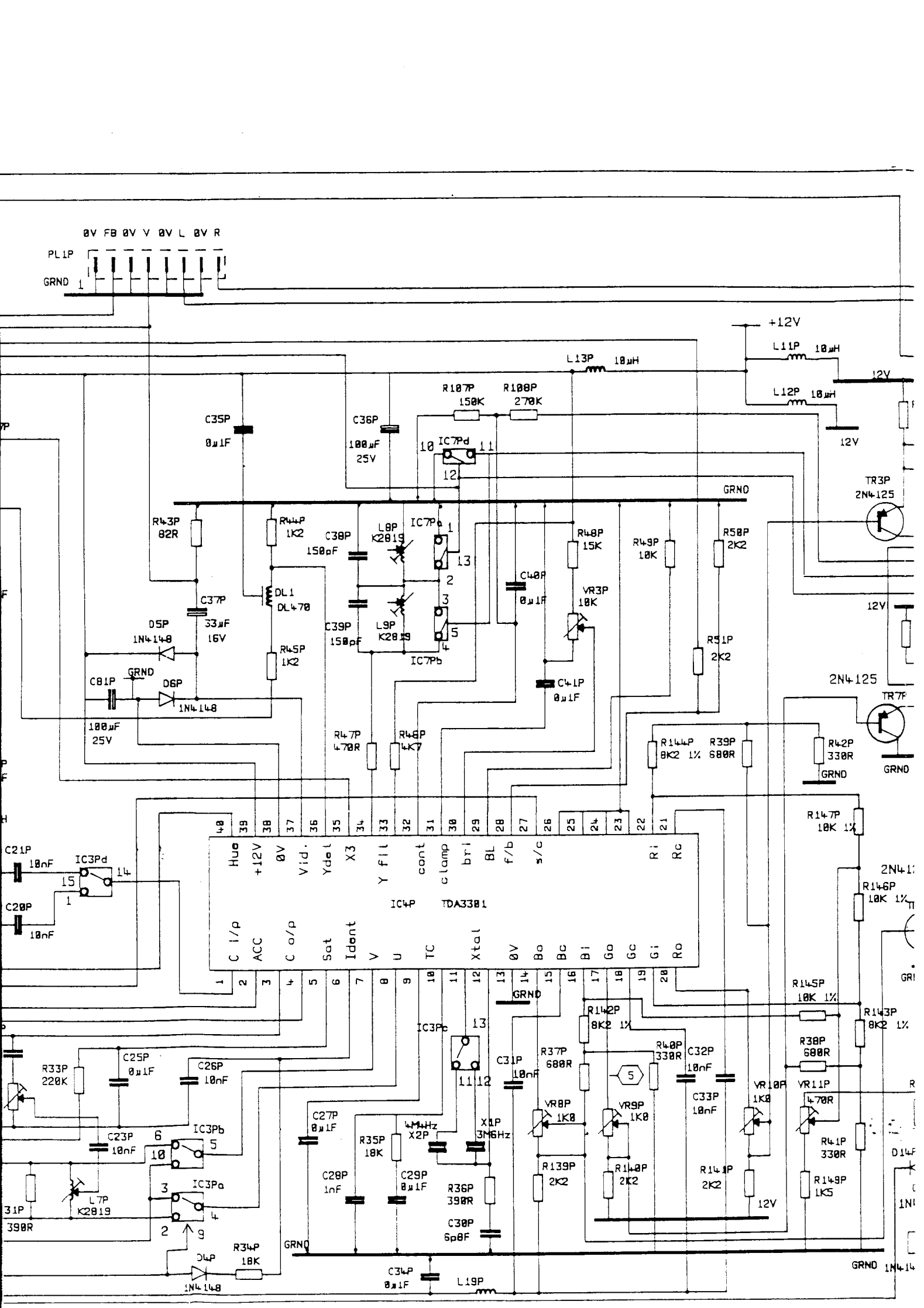

4066
IC505
LK 517
R560 470R
R561 2K2
R539 18K
0V
LK 520
R529 1K
R519 2K2
ANALOG BLUE GAIN VR605 100R
R598 220R
C522 100u 25V
TR513 2N4125
R600 18R
R608 12K
D514 1N4148
D515 1N4148
TR516 BC337
R622 1K
R623 1K
LK 531
PL517
IC503 74HCT244
R522 1K5
R521 680R
R526 820R
R520 1K5
R523 2K2
R524 2K2
R525 2K2
R518 220R
R532 18R
R527 18R
R530 18R
D501 1N4148
C504 22n
LK 513
5V
74HCT138 IC502
C502 10u 50V
TTL BLUE GAIN VR533 100R
R577 1K8
R576 680R
IC506 74LS26
R536 1K
R535 1K
R534 1K
IC506
LK 519
LK 542
12V
R552 6K8
R554 270R
C531 22n
0V
R553 39R
D506 1N4148
D507 1N4148
C512 100u 25V
TR508 2N4125
TR510 BC337
R556 1K
R555 1K
R551 12K
0V
10
R543 12K
R537 6K8
R538 270R
C508 22n
R540 39R
D502 1N4148
D503 1N4148
C529 100u 25V
C506 100u 25V
TR504 2N4125
TR505 BC337
R542 1K
R541 1K
LK 540
VR528 100R TTL GREEN GAIN
VR531 100R TTL RED GAIN
LK 509
LK 544
R545 6K8
R546 270R
R544 39R
D504 1N4148
D505 1N4148
C510 100u 25V
TR506 2N4125
TR507 BC337
R550 1K
R547 12K
R548 1K
HEIGHT VR572 10K
WIDTH VR573 4K7
H.PHASE VR574 10K
6-BIT TTL
R564 470R
R565 2K2
LK 521
LK 500
4066
IC504
R575 18K
LK 522
R563 1K
H.P
V.S
H
C586 22n
IC516
R671 4K7
D524 1N4148
R667 100R
TR525 BC237
R665 2K2
R666 2K2
R679 1K
C543 10u 50V
R668 1K
C544 2n2
R670 100K
R793 10R mff
PL513
6.3V

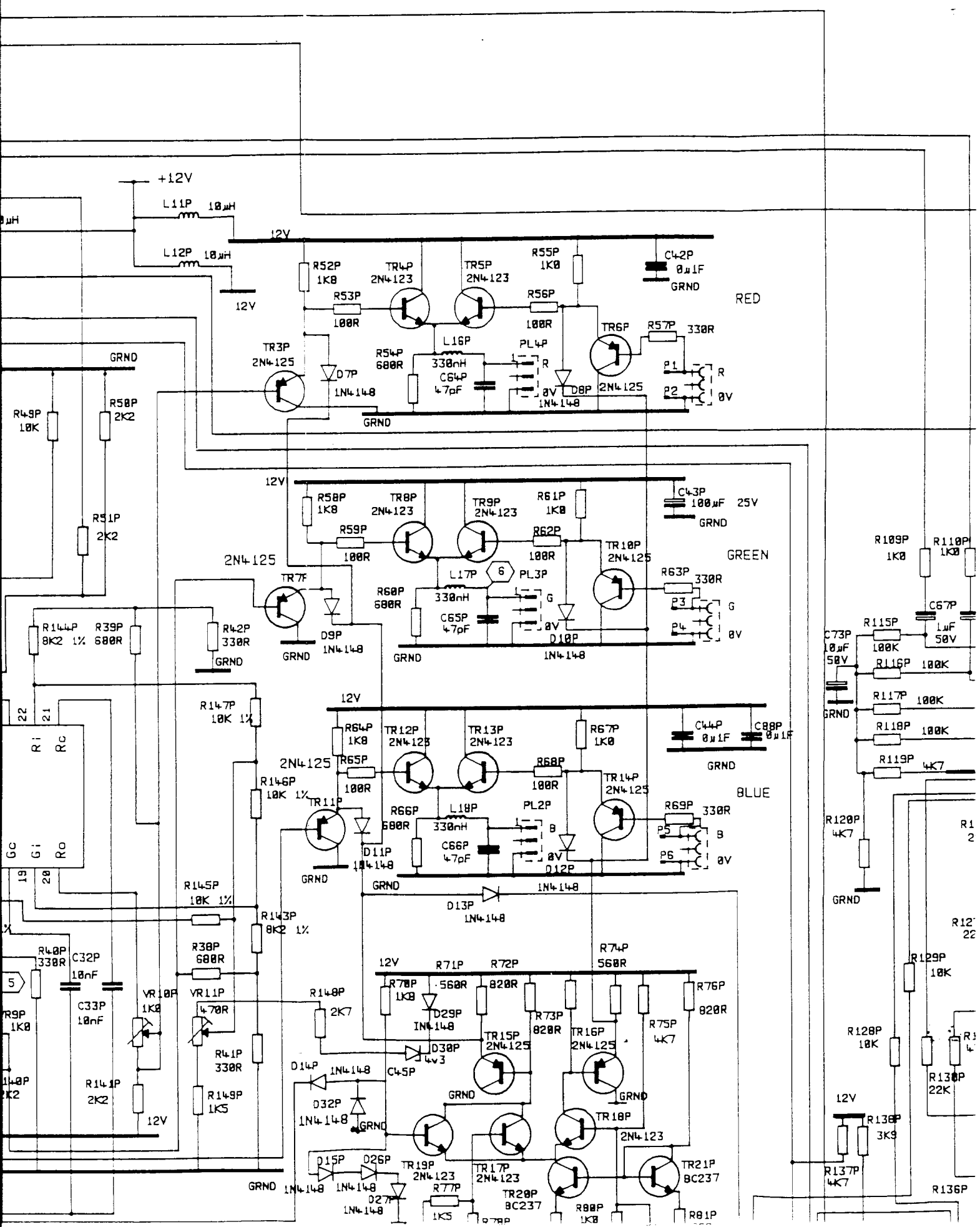

P3
PL517
4
CLAMP
C547 10u 50V
LK PL521
C548 100u 25V
R770 47R
IC513 CA3046
R686 270R
R685 1K
C552 100u 25V
R691 100R
R687 150R
R688 100R
R689 100R
C554 56p
R696 1K5
R692 82R
0V
(A)
R716 6K8
R732 12K
R745 5K6
C579 4n7
R740 100R
C577 4n7
C575 10u 50V
R741 470R
R747 4K7
R766 220R
C580 22u 25V
TR538 2N4125
C573 10u 50V
IC515 CA3046
PL522 LK
C574 100u 25V
R735 47R
R733 270R
R737 1K
C576 100u 25V
R736 100R
R743 150R
R744 100R
C578 56p
R738 100R
R746 1K5
R742 82R
12V
C531 22n 0V
D507 1N4148
R556 1K
R555 1K
R731 39R
C508 22n 0V
D503 1N4148
R542 1K
R541 1K
LK554
(C)
5V
R641 330R
8
R794 10K
R646 4K7
R648 1K
P4
R649 100R
1\4 IC508
C585 100n
1N4148 D521
R647 10K
TR517 BC237
TR518 BC237
TR520 2N4125
74HC86
R640 1K
C535 10u 25V
C592 10u 50V
R768 1M0
D530 1N4148
D518 5V1
R642 1K
R643 2K2
R644 4K7
1N4148 D520
R645 220K
C537 100u 25V
6
D505 1N4148
R550 1K
R548 1K
LK540
LK555
2K2
D522 1N4148
TR523 2N4123
R655 2K2
LK537
R650 1K
TR521 BC237
TR522 BC237
R654 1K
R638 1K
C536 10u 50V
R651 2K2
R652 4K7
D523 1N4148
R653 220K
C538 100u 25V
R656 1K
1
R667 100R
TR525 BC237
R665 2K2
R670 100K
R666 2K2
R793 10R aff
D517 5V1
C530 100u 25V
PL513
6.3V 0V 19V
B+
19V
R796 6K8
R663 10K
C599 47n
LK
IC510 CA3086
R659 3K3
D538 1N4148
R658 10K
R660 82K 2%
C539 10u 25V
C594 1n
IC511 555 CMOS
R661 6K8
R662 120K
TR531 2N4125
C596 4u7
R657 6K8 5%
C549 100n 5%
C545 100n
C595 220n
IC510
C541 10u 50V



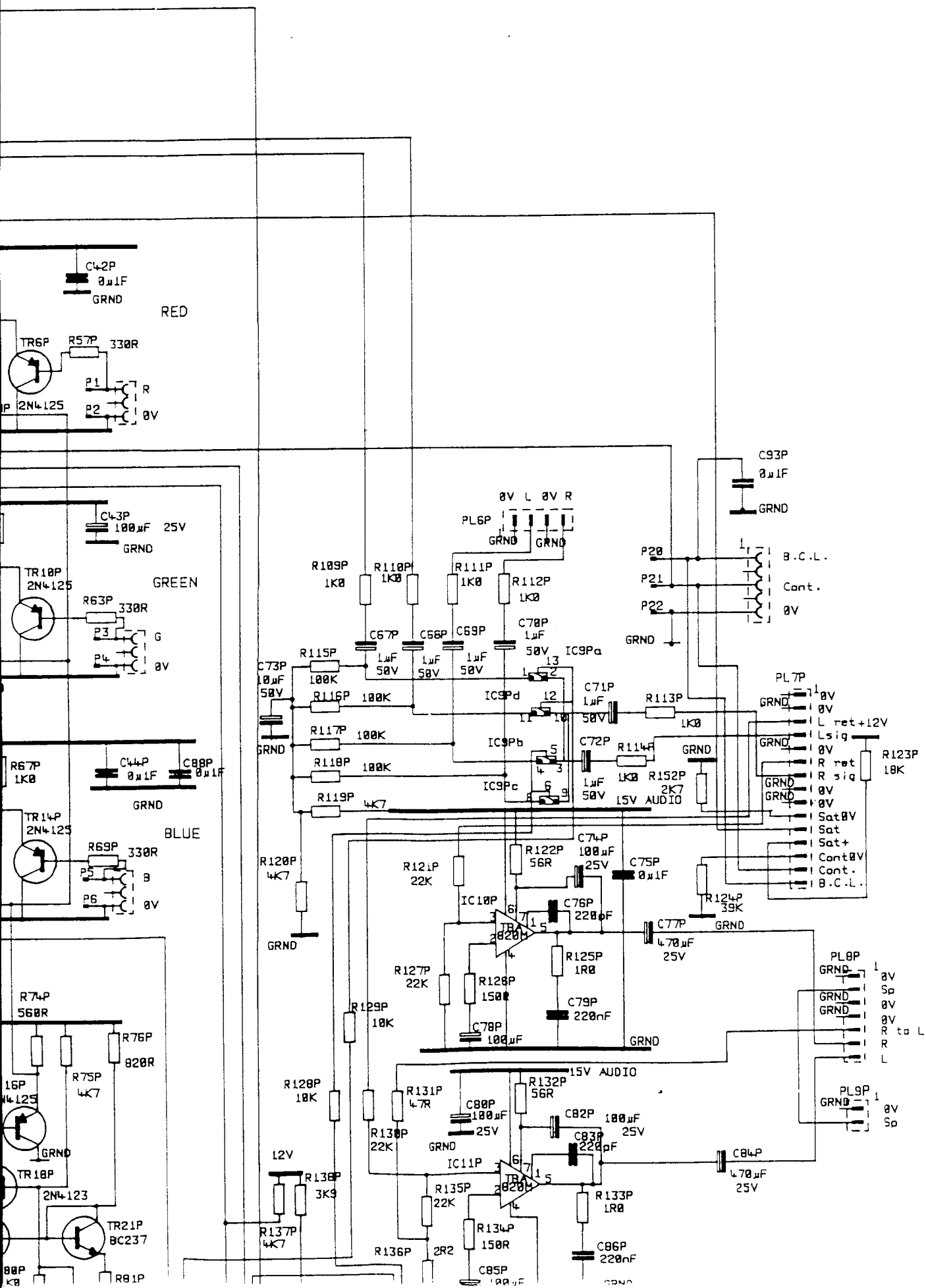
604/704MODELS 604/704 MODELS

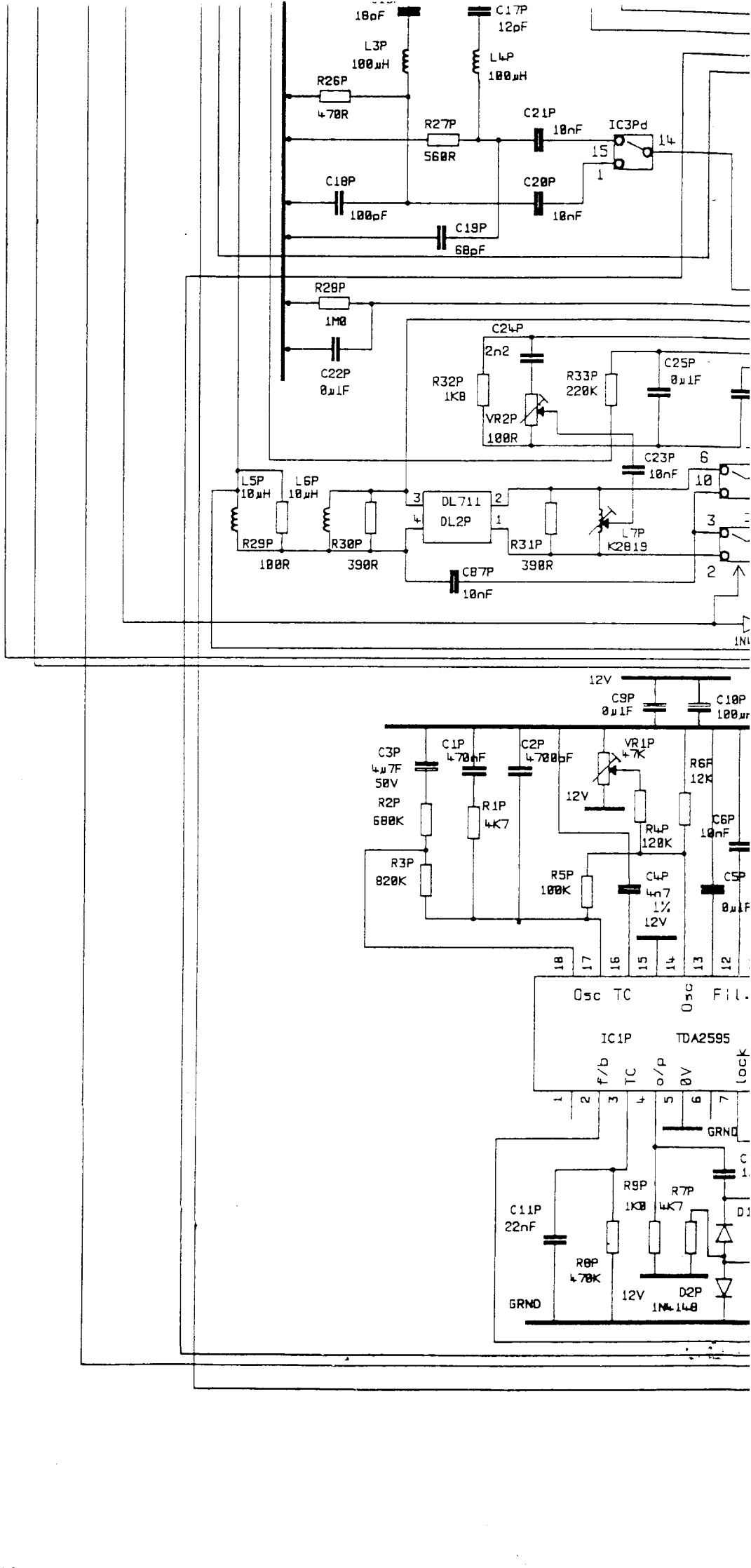

0V FB 0V V 0V L 0V R
PL1P
GRND 1
TR2P
BC237P
C35P
0µ1F
R21P
1K8
R22P
470R
R23P
560R
C14P
47pF
C15P
33pF
R24P
3K9
R25P
4K7
L1P
47µH
L2P
47µH
C16P
18pF
C17P
12pF
L3P
100µH
L4P
100µH
R26P
470R
R27P
560R
C21P
10nF
IC3Pd
C18P
100pF
C20P
10nF
C19P
68pF
R28P
1M0
C22P
0µ1F
R43P
82R
C37P
33µF
16V
D5P
1N4148
C81P
100µF
25V
GRND
D6P
1N4148
48
39
38
Hue
+12V
0V
C I/p
ACC
1
2
3
C24P
2n2
R32P
1K8
VR2P
100R
R33P
220K
C25P
0µ1F
C26P
10nF
C23P
10nF
IC3Pb
IC3Pa
L5P
10µH
L6P
10µH
R29P
100R
R30P
390R
DL711
DL2P
R31P
390R
L7P
K2819
C87P
10nF
D4P
1N4148
R34P
10K

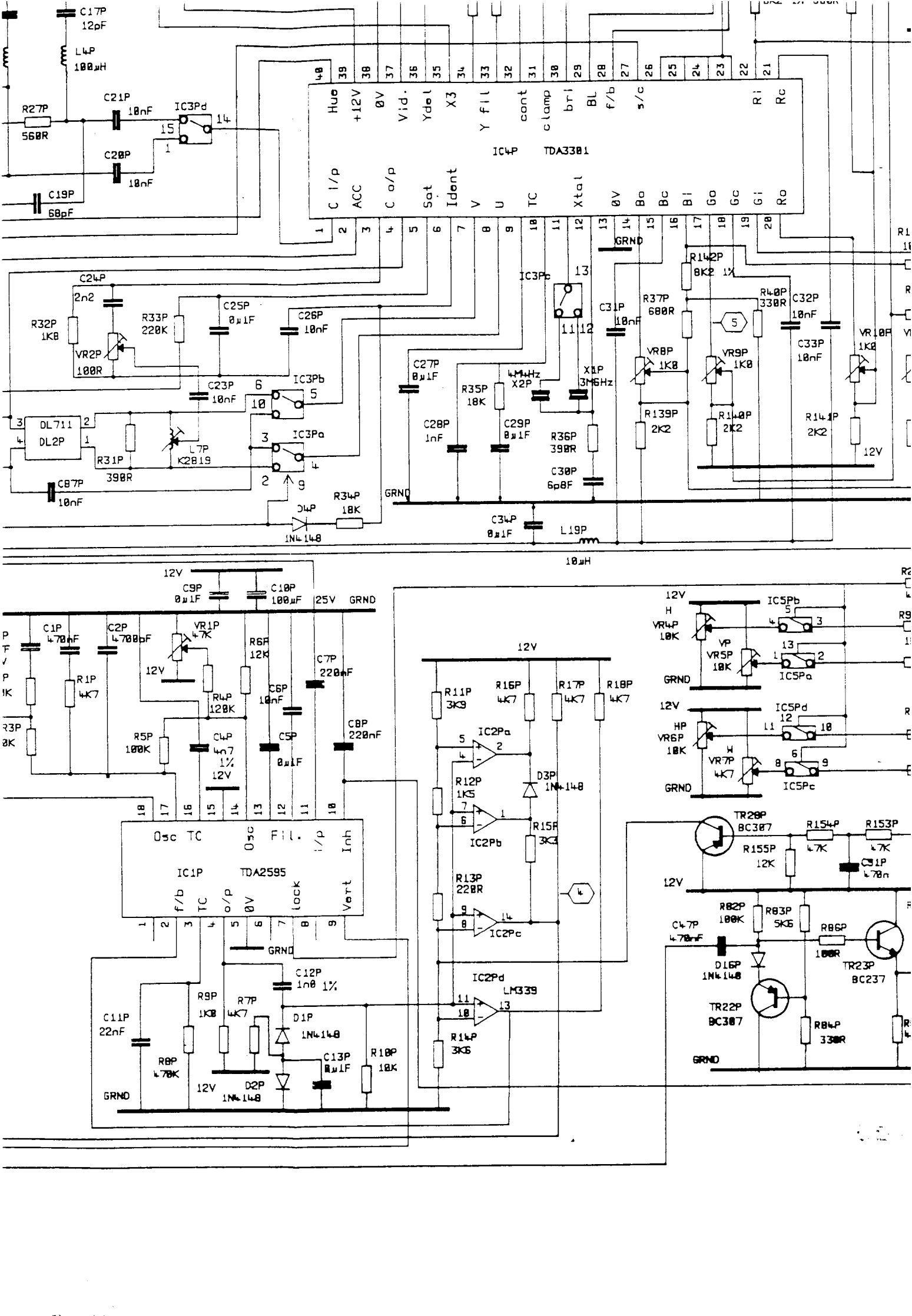

0V FB 0V V 0V L 0V R
PL1P
GRND
+12V
L11P 10µH
L12P 10µH
12V
L13P 10µH
R107P 150K
R108P 270K
C35P 0µ1F
C36P 100µF 25V
IC7Pd
TR3P 2N4125
GRND
R43P 82R
R44P 1K2
C38P 150pF
L8P K2819
IC7Pa
R48P 15K
R49P 10K
R58P 2K2
C37P 33µF 16V
DL1 DL470
C40P 0µ1F
VR3P 10K
D5P 1N4148
C39P 150pF
L9P K2819
IC7Pb
R51P 2K2
R45P 1K2
C41P 0µ1F
C81P
D6P 1N4148
100µF 25V
R47P 470R
R46P 4K7
R144P 8K2 1%
R39P 680R
R42P 330R
2N4125
TR7P
IC4P TDA3381
Hue +12V 0V Vid. Ydel X3 Y fil cont clamp bri BL f/b s/c Ri Rc
C i/p ACC C o/p Sat Ident V U TC Xtal 0V Bo Bc Bi Go Gc Gi Ro
C21P 10nF
IC3Pd
C20P 10nF
R147P 10K 1%
R146P 10K 1%
R145P 10K 1%
R143P 8K2 1%
R142P 8K2 1%
R38P 680R
R33P 220K
C25P 0µ1F
C26P 10nF
IC3Pc
C31P 10nF
R37P 680R
R40P 330R
C32P 10nF
C33P 10nF
VR10P 1K0
VR11P 470R
R41P 330R
R149P 1K5
C27P 0µ1F
IC3Pb
C23P 10nF
4M4Hz X2P
X1P 3M6Hz
VR8P 1K0
VR9P 1K0
R35P 18K
R139P 2K2
R140P 2K2
R141P 2K2
C28P 1nF
C29P 0µ1F
R36P 390R
C30P 6p8F
L7P K2819
R34P 18K
D4P 1N4148
C34P 0µ1F
L19P
GRND
1N4148

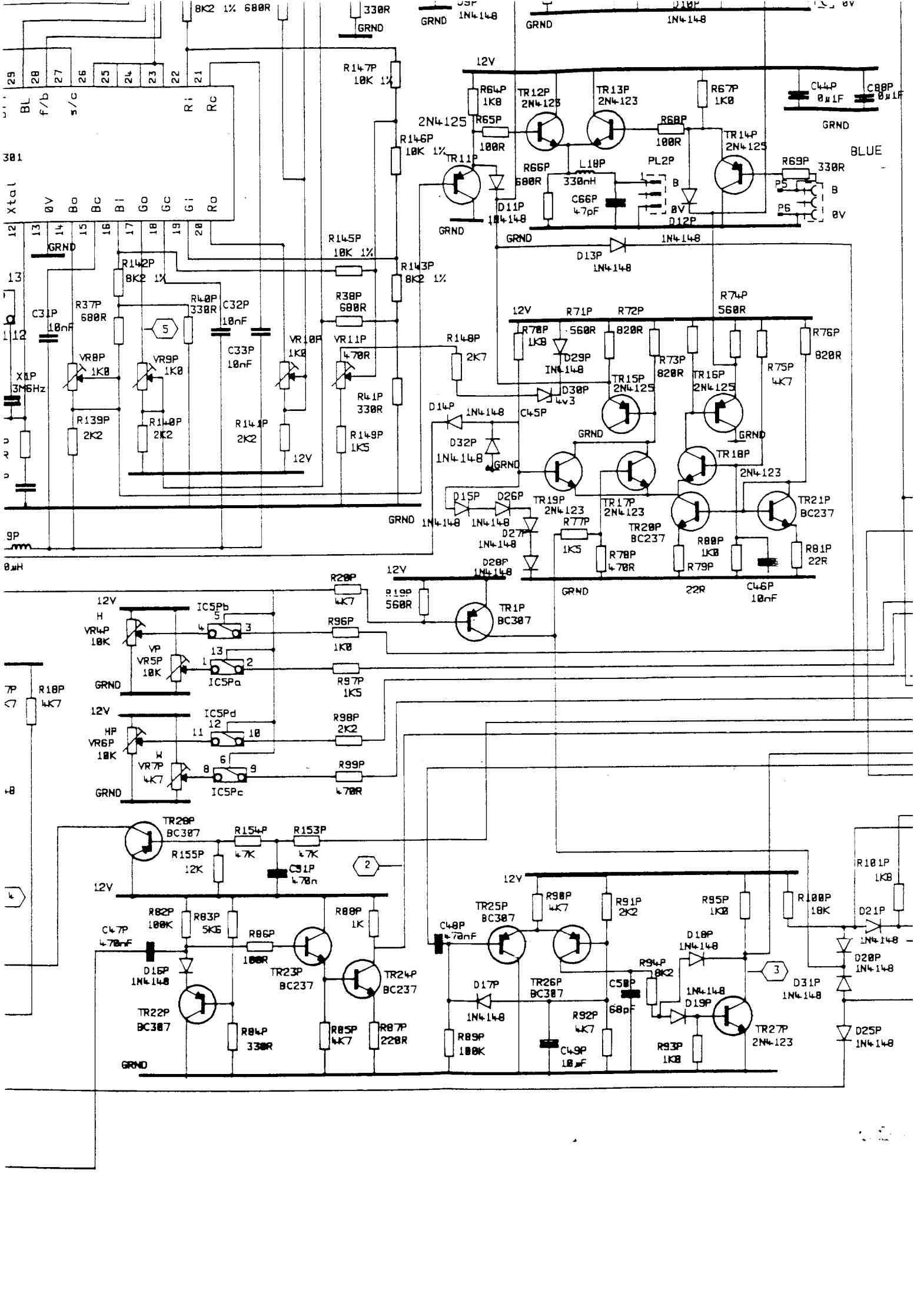

+12V
L11P 10µH
L12P 10µH
12V
R52P 1K8
TR4P 2N4123
TR5P 2N4123
R55P 1K0
C42P 0µ1F
GRND
RED
R53P 100R
R56P 100R
TR6P
R57P 330R
TR3P 2N4125
R54P 680R
L16P 330nH
C64P 47pF
PL4P
D7P 1N4148
D8P 1N4148
2N4125
P1 R
P2 0V
R49P 10K
R50P 2K2
R51P 2K2
R58P 1K8
TR8P 2N4123
TR9P 2N4123
R61P 1K0
C43P 100µF 25V
R59P 100R
R62P 100R
TR10P 2N4125
GREEN
2N4125
TR7P
L17P
PL3P
R60P 680R
330nH
C65P 47pF
R63P 330R
P3 G
P4 0V
D9P 1N4148
D10P 1N4148
R144P 8K2 1%
R39P 680R
R42P 330R
R147P 10K 1%
R64P 1K8
TR12P 2N4123
TR13P 2N4123
R67P 1K0
C44P 0µ1F
C88P 0µ1F
R65P 100R
R68P 100R
TR14P 2N4125
BLUE
2N4125
TR11P
R146P 10K 1%
R66P 680R
L18P 330nH
C66P 47pF
PL2P
R69P 330R
P5 B
P6 0V
D11P 1N4148
D12P 1N4148
D13P 1N4148
R145P 10K 1%
R143P 8K2 1%
R38P 680R
R40P 330R
C32P 10nF
C33P 10nF
VR10P 1K0
VR11P 470R
R148P 2K7
R41P 330R
R141P 2K2
R149P 1K5
R74P 560R
R71P
R72P 820R
R70P 1K8
560R
D29P IN4148
R73P 820R
TR15P 2N4125
TR16P 2N4125
R75P 4K7
R76P 820R
D30P 4v3
C45P
D14P 1N4148
D32P 1N4148
TR18P 2N4123
TR19P 2N4123
TR17P 2N4123
TR21P BC237
TR20P BC237
D15P 1N4148
D26P 1N4148
D27P 1N4148
R77P 1K5
R80P 1K8
R81P
R109P 1K0
R110P 1K0
C67P 1µF 50V
C73P 10µF 50V
R115P 100K
R116P 100K
R117P 100K
R118P 100K
R119P 4K7
R120P 4K7
R129P 10K
R128P 10K
R130P 22K
R138P 3K9
R137P 4K7
R136P
GRND
Ri
Rc
Gc
Gi
Ro
22
21
19
20

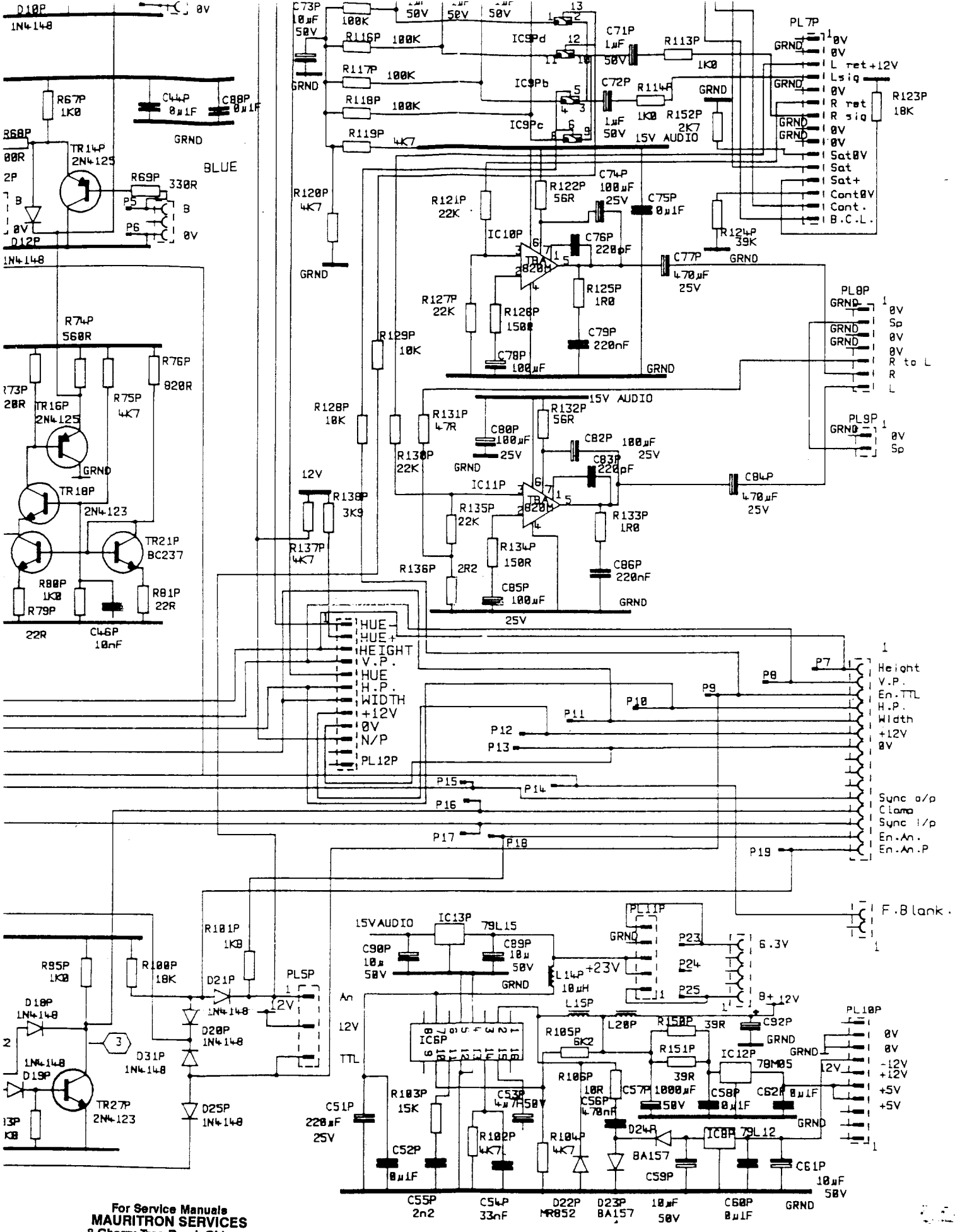
SERIES 7 MK2: DECODER PCB




18pF
C17P
12pF
L3P
100µH
L4P
100µH
R26P
470R
R27P
560R
C21P
10nF
IC3Pd
14
15
1
C18P
100pF
C20P
10nF
C19P
68pF
R28P
1M0
C22P
0µ1F
C24P
2n2
R32P
1K8
R33P
220K
C25P
0µ1F
VR2P
100R
C23P
10nF
6
10
3
2
L5P
10µH
L6P
10µH
DL711
DL2P
R29P
100R
R30P
390R
R31P
390R
L7P
K2819
C87P
10nF
12V
C9P
0µ1F
C10P
C3P
4µ7F
50V
C1P
470nF
C2P
4700pF
VR1P
47K
R6P
12K
R2P
680K
R1P
4K7
12V
R4P
120K
C6P
10nF
R3P
820K
R5P
100K
C4P
4n7
1%
12V
C5P
0µ1F
18
17
16
15
14
13
12
Osc TC
Osc
IC1P
TDA2595
f/b
TC
o/p
8V
lock
1
2
3
4
5
6
7
GRND
R9P
1K8
R7P
4K7
C11P
22nF
R8P
470K
12V
D2P
1N4148
GRND

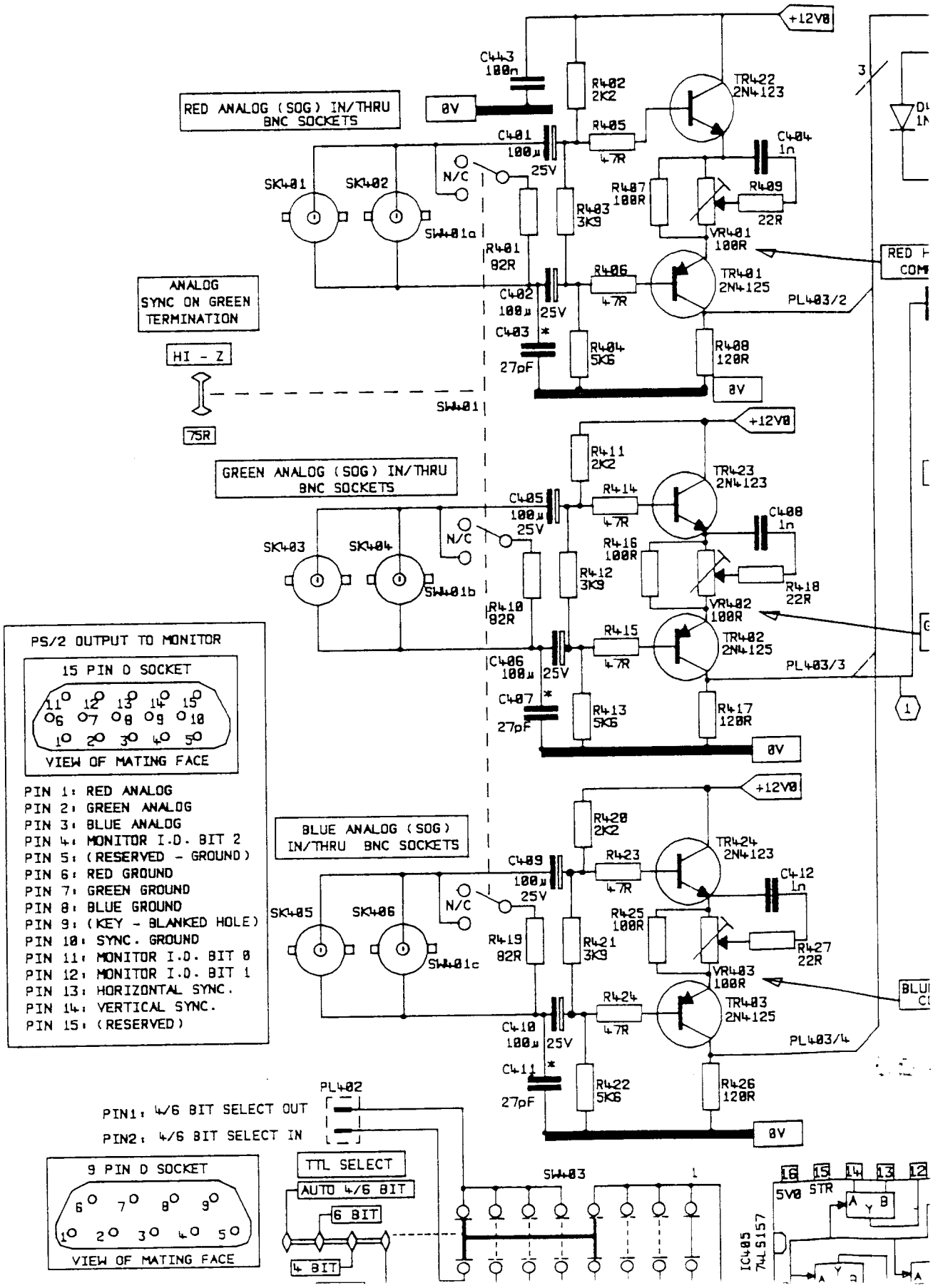

IC4P TDA3301
Hue
+12V
0V
Vid.
Ydel
X3
Y fil
cont
clamp
bri
BL
f/b
s/c
Ri
Rc
C I/p
ACC
C o/p
Sat
Ident
V
U
TC
Xtal
0V
Bo
Bc
Bi
Go
Gc
Gi
Ro
IC1P TDA2595
Osc TC
Osc Fil.
I/p
Inh
f/b
TC
o/p
0V
lock
Vert
IC2P LM339
IC5P
GRND
12V
25V
10µH

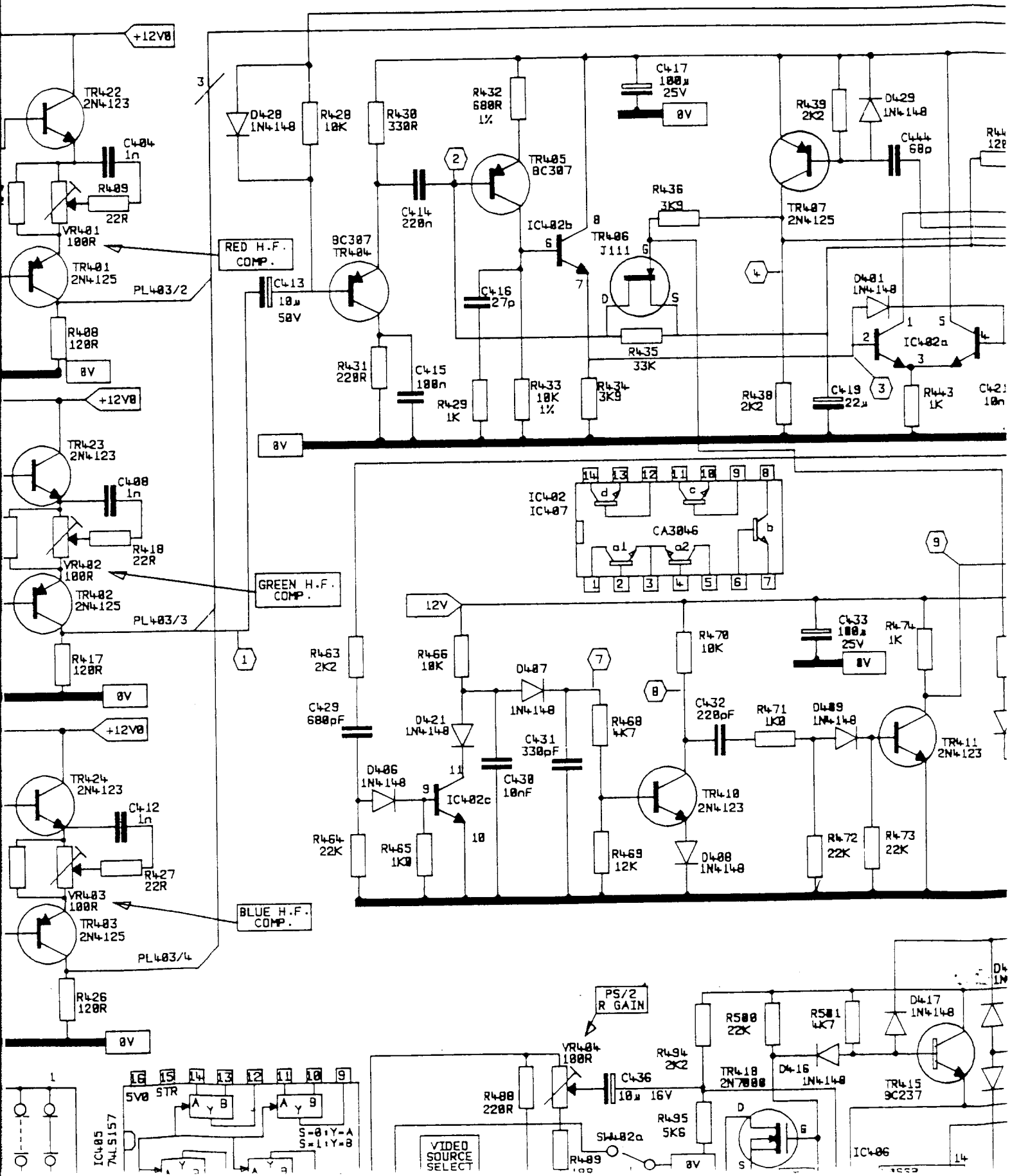

8K2 1% 680R
330R
GRND
1N4148
12V
R147P 10K 1%
R64P 1K8
TR12P 2N4123
TR13P 2N4123
R67P 1K0
C44P 0µ1F
C88P 0µ1F
2N4125
R65P 100R
R68P 100R
TR14P 2N4125
BLUE
R146P 10K 1%
TR11P
R66P 680R
L10P 330nH
PL2P
R69P 330R
C66P 47pF
P5
P6
B
0V
D11P
D12P
D13P
R145P 10K 1%
R143P 8K2 1%
R142P 8K2 1%
R37P 680R
R40P 330R
C32P 10nF
R38P 680R
R74P 560R
R71P
R72P
R70P 1K8
560R
820R
D29P
R73P 820R
R75P 4K7
R76P 820R
C31P 10nF
C33P 10nF
VR10P 1K0
VR11P 470R
R148P 2K7
VR8P 1K0
VR9P 1K0
X1P 3M6Hz
D30P 4v3
TR15P 2N4125
TR16P 2N4125
D14P
C45P
R139P 2K2
R140P 2K2
R141P 2K2
R149P 1K5
D32P 1N4148
TR18P
2N4123
D15P
D26P
TR19P 2N4123
TR17P 2N4123
TR21P BC237
R77P 1K5
D27P
TR20P BC237
R78P 470R
R80P 1K0
R79P
R81P 22R
C46P 10nF
22R
D28P
R20P 4K7
R19P 560R
TR1P BC307
IC5Pb
IC5Pa
IC5Pc
IC5Pd
VR4P 10K
VR5P 10K
VR6P 10K
VR7P 4K7
R96P 1K0
R97P 1K5
R98P 2K2
R99P 470R
R18P 4K7
TR28P BC307
R154P 47K
R153P 47K
R155P 12K
C51P 470n
R82P 100K
R83P 5K6
R88P 1K
C47P 470nF
R86P 100R
D16P 1N4148
TR22P BC307
TR23P BC237
TR24P BC237
R84P 330R
R85P 4K7
R87P 220R
TR25P BC307
R90P 4K7
R91P 2K2
R95P 1K0
R100P 10K
R101P 1K0
C48P 470nF
D17P 1N4148
TR26P BC307
C50P 68pF
R94P 10K2
D18P 1N4148
D19P
D21P
D20P 1N4148
D31P 1N4148
R92P 4K7
R89P 100K
C49P 10µF
R93P 1K0
TR27P 2N4123
D25P 1N4148
Xtal
0V
Bo
Bc
Bi
Go
Gc
Gi
Ro
BL
f/b
s/c
Ri
Rc
GRND

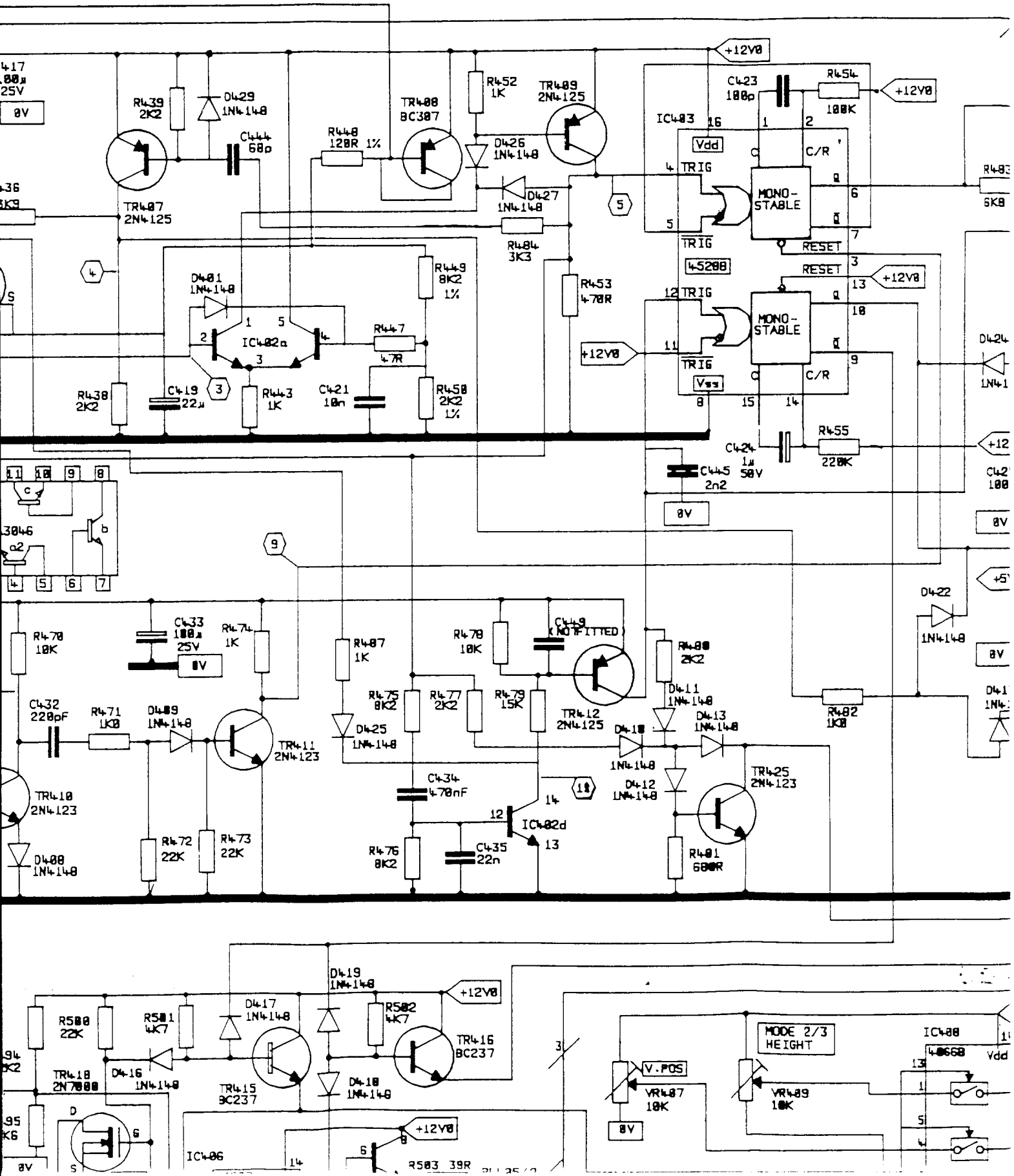


For Service Manuals
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Oxfordshire, OX9 4QY.
Tel (01844) 351694
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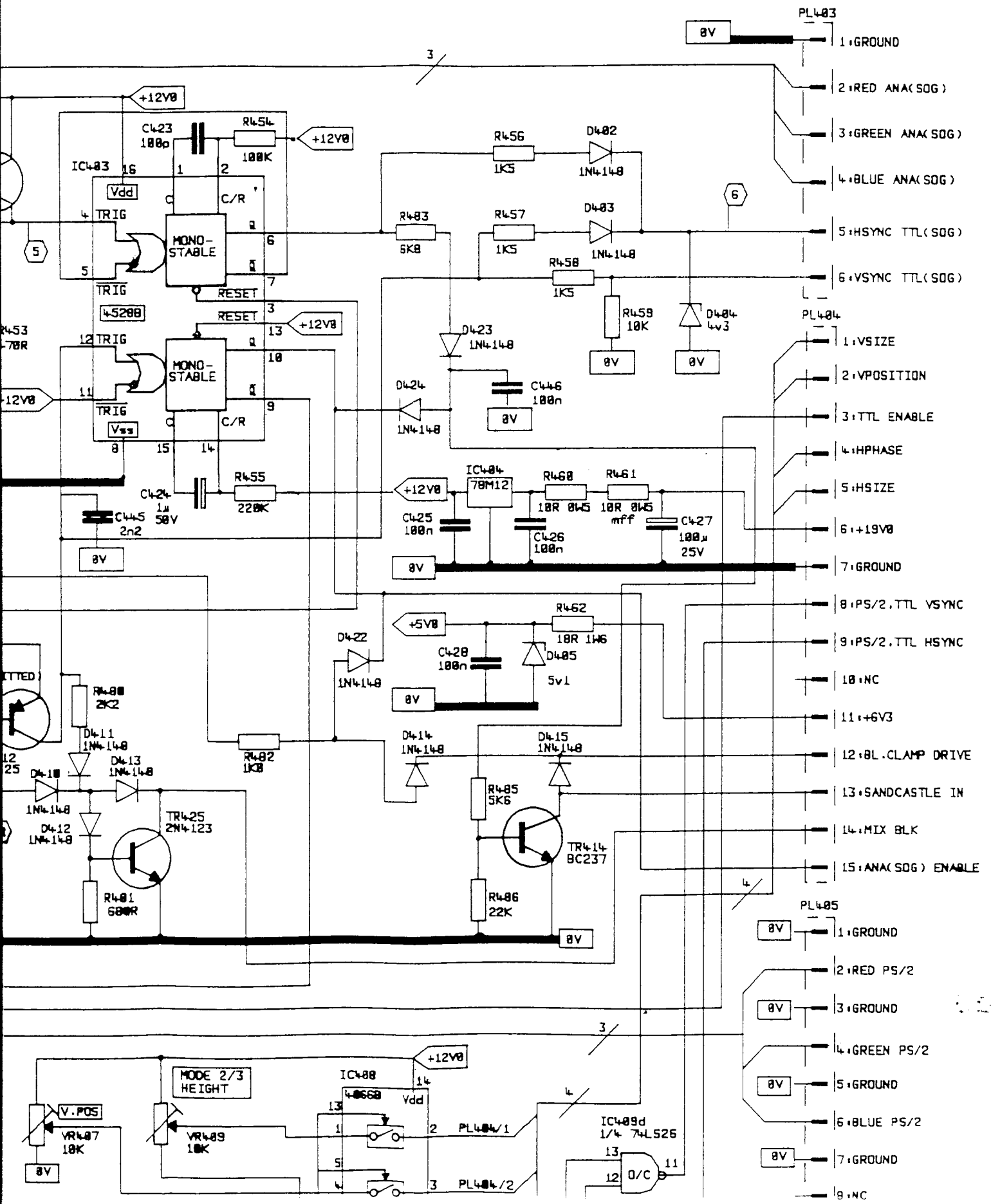
DECODER PANEL CIRCUIT DIAGRAM

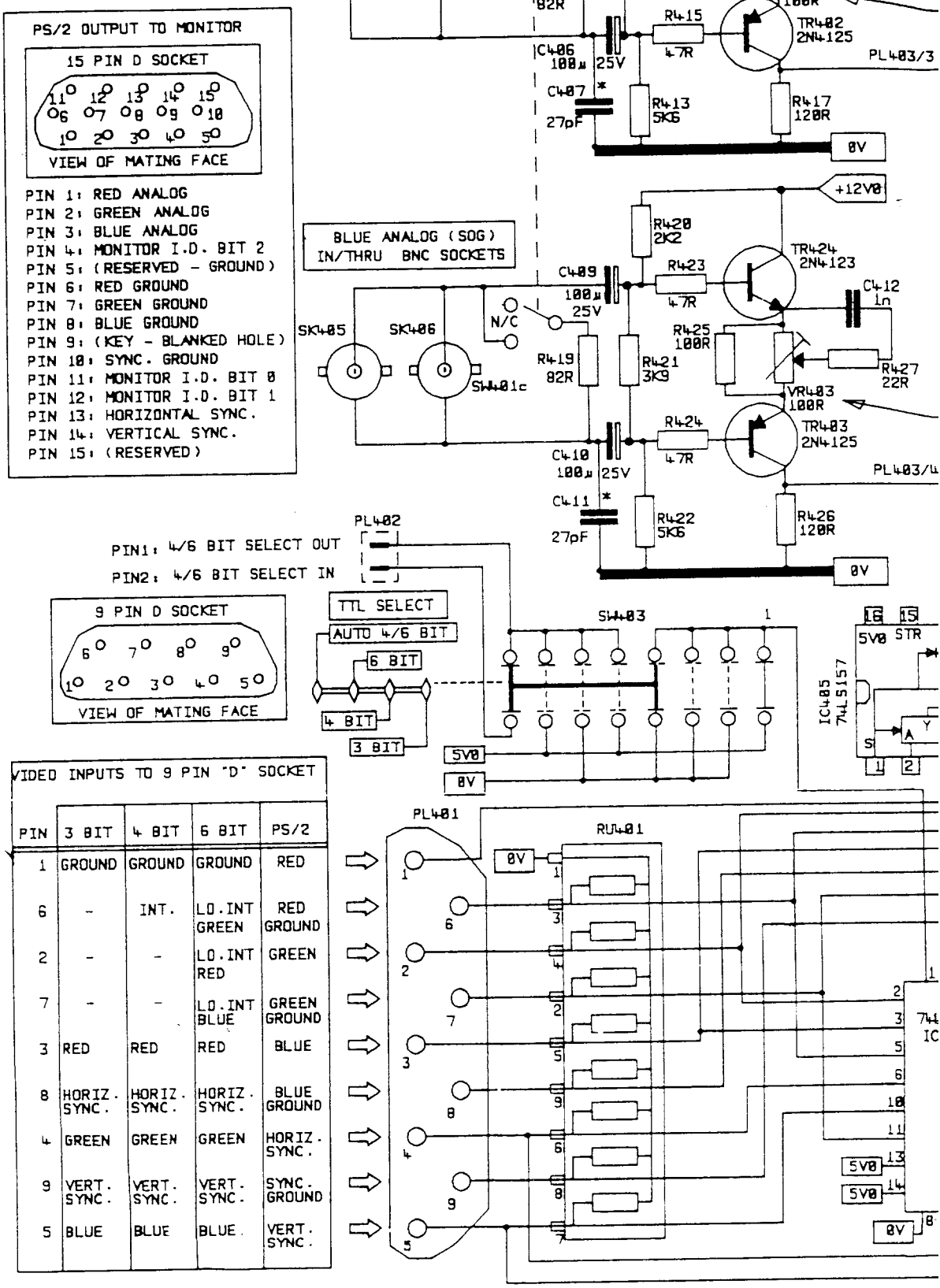

RED ANALOG (SOG) IN/THRU BNC SOCKETS
GREEN ANALOG (SOG) IN/THRU BNC SOCKETS
BLUE ANALOG (SOG) IN/THRU BNC SOCKETS
ANALOG SYNC ON GREEN TERMINATION
HI - Z
75R
+12V0
0V
C443 100n
R402 2K2
TR422 2N4123
C401 100µ 25V
R405 47R
C404 1n
SK401
SK402
N/C
SW401a
R403 3K9
R407 100R
R409 22R
VR401 100R
R401 82R
TR401 2N4125
C402 100µ 25V
R406 47R
PL403/2
C403 * 27pF
R404 5K6
R408 120R
SW401
R411 2K2
TR423 2N4123
C405 100µ 25V
R414 47R
C408 1n
SK403
SK404
SW401b
R412 3K9
R416 100R
R418 22R
VR402 100R
R410 82R
TR402 2N4125
C406 100µ 25V
R415 47R
PL403/3
C407 * 27pF
R413 5K6
R417 120R
R420 2K2
TR424 2N4123
C409 100µ 25V
R423 47R
C412 1n
SK405
SK406
SW401c
R419 82R
R421 3K9
R425 100R
R427 22R
VR403 100R
R424 47R
TR403 2N4125
C410 100µ 25V
PL403/4
C411 * 27pF
R422 5K6
R426 120R
PS/2 OUTPUT TO MONITOR
15 PIN D SOCKET
VIEW OF MATING FACE
PIN 1: RED ANALOG
PIN 2: GREEN ANALOG
PIN 3: BLUE ANALOG
PIN 4: MONITOR I.D. BIT 2
PIN 5: (RESERVED - GROUND)
PIN 6: RED GROUND
PIN 7: GREEN GROUND
PIN 8: BLUE GROUND
PIN 9: (KEY - BLANKED HOLE)
PIN 10: SYNC. GROUND
PIN 11: MONITOR I.D. BIT 0
PIN 12: MONITOR I.D. BIT 1
PIN 13: HORIZONTAL SYNC.
PIN 14: VERTICAL SYNC.
PIN 15: (RESERVED)
PL402
PIN1: 4/6 BIT SELECT OUT
PIN2: 4/6 BIT SELECT IN
9 PIN D SOCKET
VIEW OF MATING FACE
TTL SELECT
AUTO 4/6 BIT
6 BIT
4 BIT
SW403
IC405 74LS157
5V0
STR

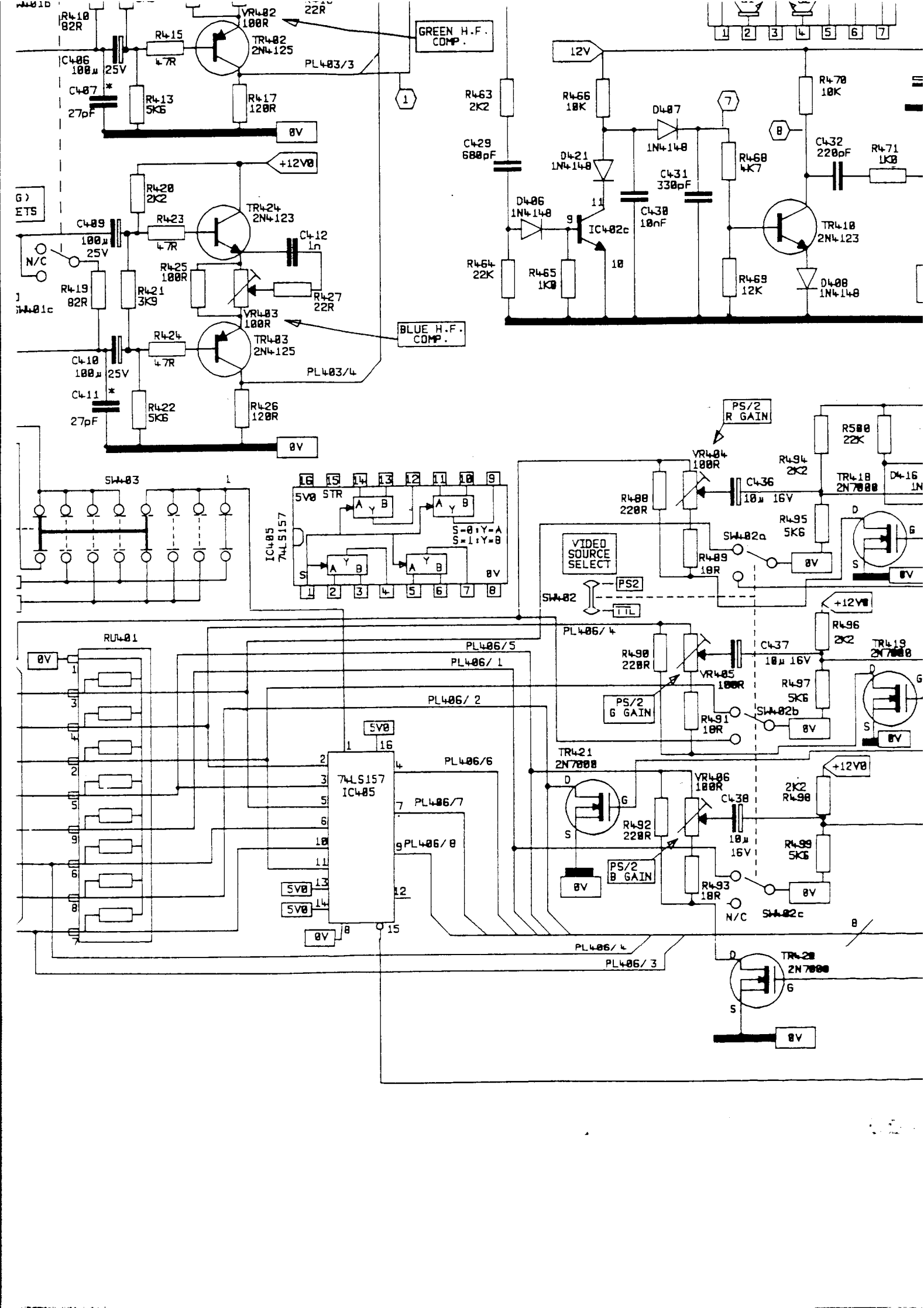

+12V8
TR422 2N4123
C404 1n
R409
22R
VR401 100R
TR401 2N4125
PL403/2
R408 120R
8V
RED H.F. COMP.
C413 10µ 50V
D428 1N4148
R428 10K
R430 330R
R432 680R 1%
C417 100µ 25V
8V
R439 2K2
D429 1N4148
C444 68p
TR405 BC307
C414 220n
IC402b
TR406 J111
R436 3K9
TR407 2N4125
BC307 TR404
C416 27p
R435 33K
D401 1N4148
IC402a
R431 220R
C415 100n
R429 1K
R433 10K 1%
R434 3K9
R438 2K2
C419 22µ
R443 1K
+12V8
TR423 2N4123
C408 1n
R418 22R
VR402 100R
TR402 2N4125
PL403/3
GREEN H.F. COMP.
R417 120R
8V
IC402 IC407
CA3046
12V
R463 2K2
R466 10K
D487 1N4148
C429 680pF
D421 1N4148
C431 330pF
C438 10nF
R468 4K7
D406 1N4148
IC402c
R464 22K
R465 1K8
R469 12K
R470 10K
C433 100µ 25V
R474 1K
C432 220pF
R471 1K8
D489 1N4148
TR411 2N4123
TR410 2N4123
D408 1N4148
R472 22K
R473 22K
+12V8
TR424 2N4123
C412 1n
R427 22R
VR403 100R
TR403 2N4125
PL403/4
BLUE H.F. COMP.
R426 120R
8V
PS/2 R GAIN
VR404 100R
R494 2K2
R500 22K
R501 4K7
D417 1N4148
TR418 2N7000
D416 1N4148
TR415 BC237
R488 220R
C436 10µ 16V
R495 5K6
S1402a
VIDEO SOURCE SELECT
IC405 74LS157
5V0 STR
S=0:Y=A
S=1:Y=B
IC406

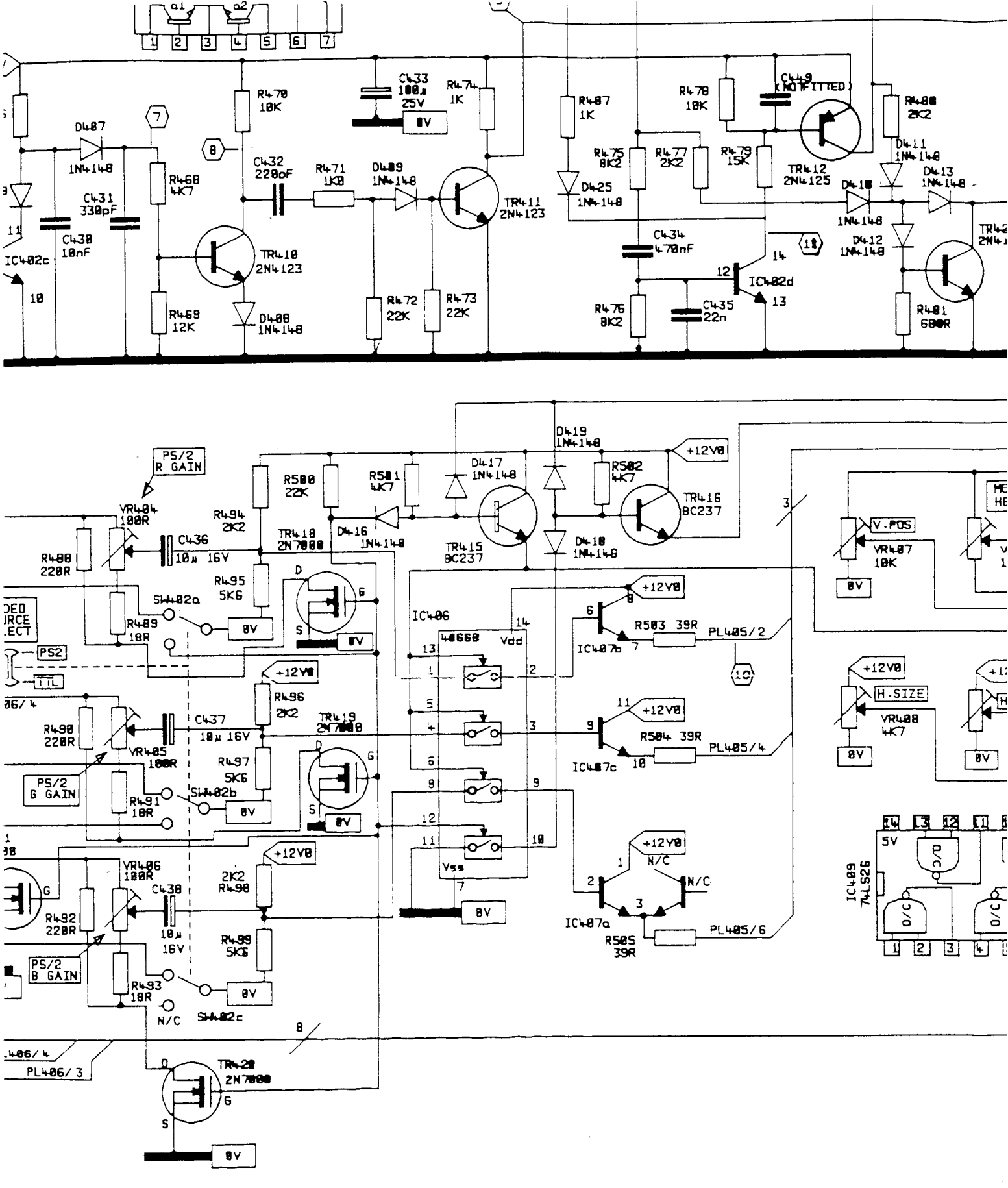

+12V8
R439 2K2
D429 1N4148
C444 68p
TR407 2N4125
R448 120R 1%
TR408 BC307
R452 1K
TR409 2N4125
D426 1N4148
D427 1N4148
R484 3K3
R453 470R
C423 100p
R454 100K
IC483
Vdd
TRIG
MONO-STABLE
C/R
RESET
45208
R455 220K
C424 1µ 50V
C445 2n2
0V
D401 1N4148
IC402a
R447 47R
R449 8K2 1%
R438 2K2
C419 22µ
R443 1K
C421 10n
R458 2K2 1%
3046
D424 1N41
D422 1N4148
R470 10K
C433 100µ 25V
R474 1K
R487 1K
R478 10K
C449 (NOT FITTED)
R480 2K2
C432 220pF
R471 1K8
D409 1N4148
TR411 2N4123
R475 8K2
R477 2K2
R479 15K
TR412 2N4125
D411 1N4148
D413 1N4148
D410 1N4148
R482 1K8
TR410 2N4123
D408 1N4148
R472 22K
R473 22K
C434 470nF
IC402d
R476 8K2
C435 22n
D412 1N4148
TR425 2N4123
R481 680R
D419 1N4148
R500 22K
R501 4K7
D417 1N4148
R502 4K7
TR416 BC237
TR418 2N7000
D416 1N4148
TR415 BC237
D418 1N4148
IC406
R503 39R
MODE 2/3 HEIGHT
V.POS
VR487 10K
VR489 10K
IC408
40668

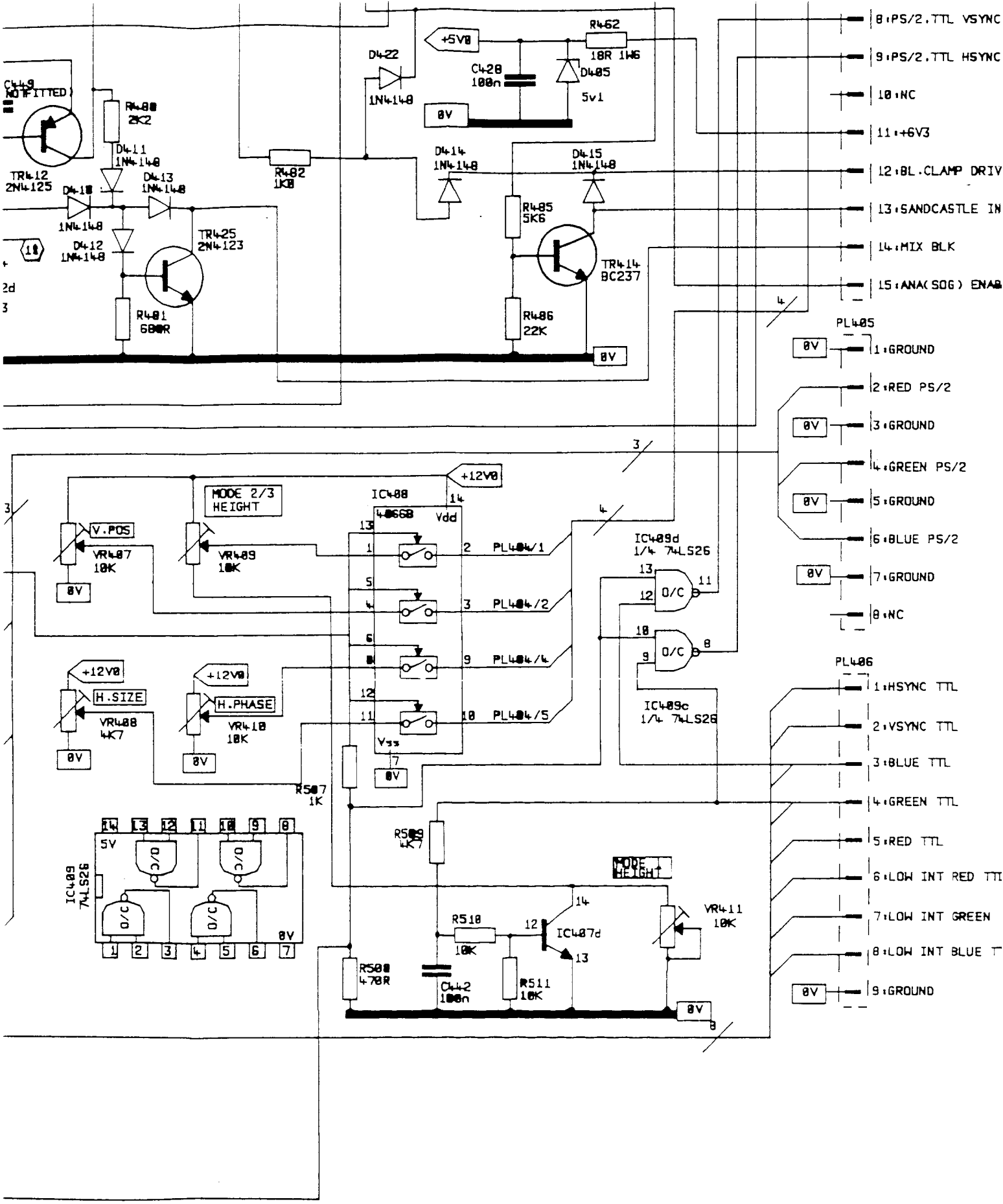
SERIES 7 MK2: PS2/DIFFERENTIAL INPUT PCB




PS/2 OUTPUT TO MONITOR
15 PIN D SOCKET
11 12 13 14 15
6 7 8 9 10
1 2 3 4 5
VIEW OF MATING FACE
PIN 1: RED ANALOG
PIN 2: GREEN ANALOG
PIN 3: BLUE ANALOG
PIN 4: MONITOR I.D. BIT 2
PIN 5: (RESERVED - GROUND)
PIN 6: RED GROUND
PIN 7: GREEN GROUND
PIN 8: BLUE GROUND
PIN 9: (KEY - BLANKED HOLE)
PIN 10: SYNC. GROUND
PIN 11: MONITOR I.D. BIT 0
PIN 12: MONITOR I.D. BIT 1
PIN 13: HORIZONTAL SYNC.
PIN 14: VERTICAL SYNC.
PIN 15: (RESERVED)
R410 82R
C406 100µ 25V
R415 47R
VR402 100R
TR402 2N4125
PL403/3
C407 * 27pF
R413 5K6
R417 120R
0V
+12V0
BLUE ANALOG (SOG) IN/THRU BNC SOCKETS
R420 2K2
TR424 2N4123
C409 100µ 25V
R423 47R
C412 1n
SK405
SK406
N/C
SW401c
R425 100R
R427 22R
R419 82R
R421 3K9
VR403 100R
R424 47R
TR403 2N4125
C410 100µ 25V
PL403/4
C411 * 27pF
R422 5K6
R426 120R
0V
PL402
PIN1: 4/6 BIT SELECT OUT
PIN2: 4/6 BIT SELECT IN
9 PIN D SOCKET
6 7 8 9
1 2 3 4 5
VIEW OF MATING FACE
TTL SELECT
AUTO 4/6 BIT
6 BIT
4 BIT
3 BIT
SW403
1
5V0
0V
16 15
5V0 STR
IC405 74LS157
S
A
Y
1 2
VIDEO INPUTS TO 9 PIN "D" SOCKET
PIN | 3 BIT | 4 BIT | 6 BIT | PS/2
1 | GROUND | GROUND | GROUND | RED
6 | - | INT. | LO.INT GREEN | RED GROUND
2 | - | - | LO.INT RED | GREEN
7 | - | - | LO.INT BLUE | GREEN GROUND
3 | RED | RED | RED | BLUE
8 | HORIZ. SYNC. | HORIZ. SYNC. | HORIZ. SYNC. | BLUE GROUND
4 | GREEN | GREEN | GREEN | HORIZ. SYNC.
9 | VERT. SYNC. | VERT. SYNC. | VERT. SYNC. | SYNC. GROUND
5 | BLUE | BLUE | BLUE | VERT. SYNC.
PL401
RU401
0V
5V0
5V0
0V


GREEN H.F. COMP.
BLUE H.F. COMP.
PL403/3
PL403/4
VR402 100R
VR403 100R
TR402 2N4125
TR403 2N4125
TR424 2N4123
TR410 2N4123
R410 82R
R415 4.7R
R413 5K6
R417 120R
R420 2K2
R423 4.7R
R425 100R
R427 22R
R419 82R
R421 3K9
R424 4.7R
R422 5K6
R426 120R
C406 100µ 25V
C407 27pF
C409 100µ 25V
C410 100µ 25V
C411 27pF
C412 1n
+12V0
0V
12V
R463 2K2
C429 680pF
R466 18K
D421 1N4148
D406 1N4148
IC402c
R464 22K
R465 1K0
C430 10nF
D407 1N4148
C431 330pF
R468 4K7
R469 12K
R470 10K
C432 220pF
R471 1K0
D408 1N4148
SW403
IC405 74LS157
5V0 STR
S=0:Y=A
S=1:Y=B
PS/2 R GAIN
PS/2 G GAIN
PS/2 B GAIN
VR404 100R
VR405 100R
VR406 100R
R488 220R
R490 220R
R492 220R
R489 10R
R491 10R
R493 10R
R494 2K2
R495 5K6
R496 2K2
R497 5K6
R498 2K2
R499 5K6
R500 22K
C436 10µ 16V
C437 10µ 16V
C438 10µ 16V
SW402a
SW402b
SW402c
VIDEO SOURCE SELECT
SW402
PS2
TTL
TR418 2N7000
TR419 2N7000
TR421 2N7000
TR420 2N7000
RU401
74LS157 IC405
PL406/1
PL406/2
PL406/3
PL406/4
PL406/5
PL406/6
PL406/7
PL406/8
N/C


PS/2
R GAIN
VR484
100R
R494
2K2
R500
22K
R501
4K7
D417
1N4148
D419
1N4148
+12V0
R502
4K7
TR416
BC237
TR415
BC237
D416
1N4148
D418
1N4148
C436
10µ 16V
R488
220R
R495
5K6
SW402a
R489
10R
PS2
TTL
IC406
40668
Vdd
Vss
R503 39R
IC407b
PL405/2
R496
2K2
C437
10µ 16V
R490
220R
VR485
100R
R497
5K6
PS/2
G GAIN
SW402b
R491
10R
R504 39R
IC407c
PL405/4
VR486
100R
2K2
R498
C438
10µ
16V
R492
220R
R499
5K6
PS/2
B GAIN
R493
10R
N/C
SW402c
IC407a
R505
39R
PL405/6
PL406/3
TR420
2N7000
V.POS
VR487
10K
H.SIZE
VR488
4K7
IC409
74LS26
5V
O/C
8V



PS2 DIFFERENTIAL INPUT CIRCUIT DIAGRAM